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MODERN ASPECTS OF THE PROBLEM OF NEOPLASIA.

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NEW YORK.

(From Columbia University, George Crocker Special Research Fund, F. C. Wood, Director.)

The mountain of cancer has labored and brought forth a mouse, said Roger Williams some few years ago. Hardly to be justified then in view of the amount of information that had already accumulated through the investigation of new growths of the mouse and rat, such pessimism is even less warranted now, at a time when transplantable neoplasms from still other species are available for research; furthermore, the biological method of approaching the question has been in use for hardly more than two decades. True, the clinician has always been an eager student of the biology (clinical behavior) of tumors, but his activities have necessarily been hampered by the fact that his primary duty has been always to heal rather than to investigate, to remove the tumor rather than to experiment with it; and although of late years the anatomist, the embryologist, the pathologist, the chemist, the zoologist, the botanist, the physicist, and the statistician have all contributed the most valuable assistance, yet so insoluble is the riddle that it has thus far proved refractory even to concerted effort, as for so many centuries it had been able to resist the attack of the clinician alone.

While it is impossible at present to state definitely just what a tumor is, it can at least be said with a fair amount of certainty what it is not, and even this must be regarded as an encouraging advance, when cognizance is taken of the difficulties with which the problem is beset. A neoplasm can be defined only as a tissue overgrowth which is independent of the laws governing the remainder of the body; further than this it is impossible to go. It cannot be asserted, as was once the custom, that this lawlessly proliferating tissue subserves no useful purpose in the organism, since there is reason to believe that the cells of a tumor involving a gland of internal secretion may continue to elaborate the material characteristic of that organ, and thus prevent the body from being deprived of the secretion as it would be were the gland in question to undergo destruction by some other disease, for example, tuberculosis. Such a situation is rare, it must be confessed, yet the fact that it can exist at all is sufficient ground for excluding uselessness from the characteristics properly to be embraced in the definition. Neither can it be said that a new growth is always characterized by the atypical arrangement of its cells, since an occasional example, particularly in the thyroid gland or the liver, differs little or not at all in histology from the normal structure in which it originates, betraying a neoplastic nature solely by its clinical behavior.

Continuous growth also must be dismissed from the definition, because a few tumors undergo partial or complete regression, although the great majority of them do, of course, proliferate indefinitely, and because the successful cultivation of normal tissue in cultures outside of the body for a period exceeding two years suggests that this material, too, may be capable of unlimited proliferation under suitable conditions. If the inference be sound, then the faculty of continuous growth is to be regarded as characteristic, not only of neoplasms, but of tissues in general, when the proper environment is furnished.

The optimistic note struck at the outset of this article must not be misinterpreted; nobody believes that the cause and the cure of malignant growths will be discovered this month or this year; far from it. But the large amount of information already gained does encourage the expectation that the problem will not continue indefinitely to elude us, though to-day, it must be confessed, it is possible only to prepare bricks for a structure which it is hoped can some day be erected. A more cheerful outlook is appreciable since it has become possible to study new growths in animals and to transfer them from one to another, since this method of investigation may be relied upon to furnish even more information in the future than it has in the past; it is with this aspect of research that the present article will chiefly concern itself.

Malignant growths have been discovered throughout the animal kingdom as far down as the reptiles, and have been successfully transplanted, beside the

mouse and rat, in dogs, rabbits, and guinea-pigs, while lesions resembling the true tumors in many respects are being studied in the domestic fowl and the trout. The tame mouse and rat have been chosen for investigation principally because of the readiness with which they can be obtained and the facility with which they can be handled, and the fact that the more recent knowledge of cancer depends almost entirely upon observations on these animals must not be taken to imply that the findings would not hold good for malignant growths in other species, were it convenient to inquire into them in the same way.

The most common tumor of the mouse is a hemorrhagic adenocarcinoma which originates in the mammary glands of old females, though almost all the varieties found in the human subject, including sarcoma, have been described. The clinical course of the disease follows closely that which it pursues in man. Thus, these tumors are characterized by metastasis through both blood and lymph channels, infiltrative growth, and recurrence after removal; moreover, death is almost invariably the final outcome of their presence, since less than one per cent. of the spontaneous growths retrogress.

The tumors of animals have provided the pathologist with an ideal means for investigating the parasitic hypothesis. A careful record kept for several years of the many thousands of cancer-bearing mice in Bashford's laboratory in London furnished not the slightest evidence to suggest transfer of the disease from one mouse to another. Again, those tumors that have arisen in the "cancer cages" described from time to time in the literature have occurred generally in old female mice, and have developed in most instances in the mamma; that old animals should have been affected at the site where cancer ordinarily develops suggests that these alleged epidemics were due merely to the sudden outcropping of a number of spontaneous new growths, and makes it quite unnecessary to invoke an infectious etiology, while at the same time it furnishes additional evidence against the existence of so-called "cancer-houses," which are to be discussed in a succeeding paragraph.

The spontaneous tumors of the mouse are transplantable into other mice, it is true, but this fact affords no support to the hypothesis now under consideration, for the transfer is not in any way an infection, but, on the contrary, a genuine transplantation. Within the first few days after its insertion, the graft is penetrated by fibroblasts and blood-vessels from the host in large numbers, and these rapidly replace the old stroma which dies within the first two or three days following transplantation. The parenchyma, on the contrary, survives, and by the active division of its cells gives rise to the new tumor; there is no evidence that neighboring elements in the host's tissues are converted into cancer cells.

The transplanted tumors thus produced are to be sharply distinguished from spontaneous neoplasms, for the former are composed of cells from a certain animal growing in the body of another, and consequently existing under somewhat adverse conditions; thus, the Jensen mouse carcinoma, which is being propagated to-day in laboratories throughout the entire world, is made up of the descendants of cells from the Copenhagen mouse in which Jensen discovered it more than fifteen years ago. Widely different is the case of a spontaneous neoplasm, the cells of which are situated in an environment much more favorable for their continued proliferation, since they are those of the animal itself in which the tumor originated. One indication of this distinction may be found in the observation that transplanted growths frequently retrogress, whereas among spontaneous tumors of the mouse such an event hardly ever takes place; and the difference is shown again in the readiness with which a spontaneous tumor can be engrafted into the mouse in which it arose, as contrasted with all other mice.

Mice may be immunized against the transplantation of cancer by unsuccessful inoculation of a mouse tumor (for propagation is not invariably successful), or by treatment with normal and intact cells of their own species, but the tissues of an animal itself when reintroduced into its organism have not the power to confer resistance, nor can a mouse bearing a spontaneous tumor be immunized with the tissues of other mice against the inoculation of its own growth into another part of the body. This fact is of extreme practical importance in its bearing upon attempts to circumvent metastasis or recurrence.

When a graft is implanted into an animal which has been made refractory, the penetration of fibroblasts and blood-vessels described in a preceding paragraph does not set in, and the fragment gradually dies from mere inanition; nothing occurs to suggest its destruction by any immune forces similar to those with which we are at present acquainted. But this resistance is directed only against a graft which is in process of establishing itself in a new host, having no inimical effect upon a transplanted tumor that has already gained a foothold, and it would certainly be even less effective against a spontaneous neoplasm; hence, the treatment of malignant new growths in man by means of tissue emulsions, filtrates, and so forth, receives no sup-

port from the experimental work so far accomplished in the laboratory.

When the reports of such therapeutic endeavors are subjected to critical examination it becomes at once apparent that much of the improvement is due to psychic phenomena, affecting both physician and patient. Osler has published an instructive example of how great an influence may be exerted temporarily by the mind, in the case of a patient with gastric carcinoma who gained eighteen pounds in weight after visiting a sanguine consultant and hearing his optimistic diagnosis. The tingling, itching, hyperemia, and other local symptoms advanced with such pathetic regularity as proof of a direct attack upon the tumor by the therapeutic agent in question, are often imaginary, or, as in ulcerated growths, can frequently be referred to elimination of the medicament from the raw surface, as Weil has recently indicated. Furthermore, an air of judicial impartiality is often lacking in these descriptions by reason of an unfortunate tendency to omit exact measurements of the growths, or the results of microscopic examination, or both. Finally, the patients almost invariably die of the tumor.

It is not wise to rely too implicitly upon reputed cures even in the case of transplantable malignant neoplasms in animals, since they vary greatly in their power to grow indefinitely. Many of these carcinomata undergo spontaneous regression after proliferating vigorously for a few weeks, and among transplantable sarcomata such an outcome occurs even more frequently; the tumor known as the Buffalo rat sarcoma, for example, sometimes recedes in every rat, and its average percentage of retrogression is no less than forty.

It was believed until very recently that a tumor could be transplanted only into animals of the species within which it arose—that a mouse tumor, for example, could be successfully engrafted only into mice. Murphy has shown, however, that the resistance which an animal possesses by virtue of its race is in some way connected with its lymphoid system, and that when the activities of these tissues are repressed by exposure to *x*-rays or by the administration of benzol, the organism becomes receptive to tumors from a strange species. In this way it has been possible to grow mouse sarcomata in rats.

The fowl sarcoma of Rous has proved to be a most interesting growth, though whether it actually merits the term sarcoma remains still to be determined. It possesses the morphological characteristics usually associated with this class of neoplasm, and many of the biological properties of the true tumors, but differs fundamentally from carcinomata and sarcomata of the mouse and rat in being transmissible by means of a cell-free filtrate. Now the fact that new growths of the mouse and rat can be successfully propagated only through the inoculation of living and intact cells has been one of the most powerful arguments against the parasitic hypothesis of neoplasia in general, and still remains so; for even though the chicken sarcoma should finally prove to be a true tumor and the product of a parasite, Rous himself would probably be the first to discountenance any attempt to extend these findings in explanation of the origin of all tumors, since nothing seems more probable at present than that there is no single etiological factor.

In spite of the many hypotheses that have been advanced to account for the development of neoplasia, there exists almost no exact information regarding this problem; indeed, it is not even definitely known whether, as a group, the new growths have one cause in common, or whether each member of the series has its own determining factor, though it may be said that the latter alternative has much to commend it. Nevertheless, this much, at least, appears clear—that there is some distinct and important connection between tumors and chronic irritation. The effect of a single trauma is not so well understood; the event may, perhaps, lead to the development of a neoplasm, though in many cases there can be little doubt that the association is a coincidence, while in others the injury but serves to direct attention to a neoplasm already present. In the case of chronic irritation, however, the evidence is much more definite. Cancer about the mouth in smokers or in individuals with roughened, carious teeth, *x*-ray cancers, and those originating in scars or ulcers, spring at once to mind in this connection. That the occurrence of neoplasms in the irritated areas is a matter of pure chance is rendered improbable by the large number of recorded instances, no less than by the observation that tumors are likely to arise in any conceivable region of the body exposed to chronic irritation. Occupations and racial habits together constitute, in reality, an extensive experiment. Thus, epithelioma in the skin overlying the abdomen is very common among the natives of Kashmir, who wear a basket of glowing charcoal under their robes for purposes of warmth, and cancer of the mouth equally common in natives of India and the Philippine Islands who chew betel-nut, the neoplasm developing in the former case just where the effects of the heat are most intense, and in the latter at the site where the betel-nut is retained against the cheek. The importance of these observations lies in the fact that cancer in the locations mentioned is prac-

tically unknown in other races. No less instructive are such occupational neoplasms as carcinoma of the scrotum in chimney-sweeps, tumors of the bladder in those who manufacture anilin dyes, and sarcoma of the finger in needlewomen. Moreover, instances suggesting a relation between chronic irritation and the development of neoplasms are not limited to man alone. In the draught cattle of India, squamous-cell carcinoma is a common lesion at the root of the right horn, by which they are attached to wagons or agricultural implements, but it is never found at the root of the left; while it has been shown that carcinoma in horses occurs most frequently where the bit irritates the corners of the mouth, and subcutaneous fibromata most often at the points of pressure by collars and girths. In dogs, the posterior mammae, those most commonly engorged, are most apt to be attacked; in the cow, carcinoma of the liver, which is not a rare disease, is almost invariably connected with severe biliary cirrhosis due to infection with a parasite.

Hepatic carcinoma in the cow is thus complementary to that type of rectal and vesical cancer which occurs in man in association with infection by the *Bilharzia hematobia,* and the two together show the futility of trying to explain cancer as a disease of civilization. Both organisms, separated as they are in the zoological scale, develop tumors at a point exposed to chronic irritation, and apparently in obedience to a law of wide application, since neoplasia assails the entire animal kingdom at least as far down as the reptiles. It does not attack man because of his civilization, nor does it show any greater preference for cultured than for savage races. It is discovered oftener in highly civilized people because they live to a more advanced age and because they have access to a variety of diagnostic measures denied to the inhabitants of less advanced countries, and not because it occurs more frequently in them. Similarly, cancer does not attack the domestic animals on account of their close association with civilization, sparing wild animals, but develops in the former solely for the reason that they attain higher age periods by reason of man's care, and is discovered in them because they are autopsied with comparative frequency.

Chronic irritation, accordingly, appears to be responsible for the inception of certain neoplasms, yet it cannot be the only factor in their etiology, otherwise every individual subjected to it would develop a tumor. This, of course, is not the case, and other causes must therefore be sought. A second has been discovered by Murray, of London, who has found that the offspring of mice suffering from spontaneous (as distinguished from transplanted) carcinoma are about twice as likely to develop such a tumor as are mice descended from normal parents and grandparents. This information he would apply to the human subject, however, only with the greatest reservation, since the cancerous ancestry in the mice of this experiment was much more concentrated than ever it would be in the great majority of human beings. Many of the so-called "cancer families" in man can be explained by chance, since there must occur some families in which several members will die of cancer, just as there must be others in which none will perish of this disease. Therefore, while it cannot be denied that there may be found an occasional family with a concentrated cancerous heredity, there is, in general, no occasion for alarm.

But the two causes, chronic irritation and predisposition, are in themselves apparently not sufficient for the inauguration of a neoplasm. A third factor seems to be necessary, and this is age. By far the largest number of tumors, both in man and in the lower animals, affect individuals who have passed middle life, and in the experiments just cited carcinomata did not develop any earlier in the mice of cancerous ancestry than it did in the other group. Still, in many cases it seems to be not the age of the individual himself that is of importance, but the age of the tissue in which the neoplasm originates. This may explain the fact that cancer of the breast, uterus, and gastro-intestinal tract appears with relative frequency early in middle life, cancer of the skin, on the contrary, rarely before sixty or seventy. It is a matter of some clinical interest to observe, in this connection, that carcinoma is by no means so rare in children and young adults as it was formerly supposed to be, and that a proper interpretation of the statistics proves that sarcoma, as well as carcinoma, occurs more frequently in the higher age periods. When carcinomata do occur in young individuals, they usually exhibit extraordinary malignancy, whereas those occurring very late in life are often relatively benign.

No definite proof has ever been offered by human pathology in support of the parasitic origin of neoplasia, the parasites mentioned in a preceding paragraph being regarded merely as the cause of a chronic irritation which, in its turn, gives rise to the tumor. The existence of "cancer villages," "cancer streets," and "cancer houses" together with much of the other evidence so frequently advanced in support of the parasitic hypothesis, must, like the existence of "cancer cages," be viewed with skepticism until more cogent proofs have been adduced to sustain the contention. It can often be shown, for example, that a "cancer village" is one in which

the population is composed largely of individuals in the cancer age, most of the younger ones having migrated to the cities, while those who describe "cancer houses" take no account of the law of chance. As Adami has so well said, in discussing this question: ". . . by the law of chance, just as one individual in a thousand may be of gigantic proportions, so one house in a thousand may show a great excess of cases of cancer—or of twin births —over the ordinary run of houses." Few of the reports describing the transfer of cancer from one person to another (*cancer à deux*) are in any way convincing. If large numbers of individuals could be experimentally engrafted with a neoplasm, as mice are engrafted, a certain proportion might develop tumors; at any rate, a carcinoma sometimes becomes implanted upon an adjacent area of the patient's body, and there is no reason to suppose that the cells of a malignant growth would not proliferate in other individuals also, if they could be introduced under suitable conditions. But the ordinary contact of physician or nurse with a patient, or between two persons residing in the same house, is not close enough for the transference of living tumor cells.

It may be asserted definitely that no relation has been observed between diet and neoplasia, since tumors are discovered with equal frequency in vegetarian races and those living on a mixed diet, nor is there any convincing evidence of a connection between the occurrence of neoplasms and the character of the soil, the climate, or other surroundings.

The possibility of inciting a new growth in tissues previously normal has attracted and maintained the interest of a large number of investigators. The recorded attempts are numerous and if, as is probable, there have been still others which have never been published because of their negative outcome, the number of times that the experiment has been made must be very large. The greatest number have been molded to fit one or the other of the two most widely known hypotheses of tumor genesis—the hypothesis of cell irritation and that of cell displacement, following which investigators have irritated cells or misplaced them in every conceivable way; but, save for Clunet's experiments, where sarcomata appeared in rats that had been exposed to *x*-rays, the outcome has always been negative. The power of these rays to incite malignant growth is sadly evident, moreover, in the number of roentgenologists who have developed carcinomata on the hands in consequence of the freedom with which they exposed themselves before the necessity for a protecting screen had been recognized. The recent work of Fibiger may prove to be a second exception; at present, however, it is still so recent as to lack confirmation. Fibiger reported carcinoma of the stomach in rats fed for sixty-six days or more on cockroaches infected with a nematode which he has named *Spiroptera neoplastica,* and for which the cockroaches *Periplaneta americana, P. orientalis, Blatta Germanica,* and the mealworm (*Tenebrio molitor*) are the intermediate hosts. In two instances the tumor metastasized in the lungs, and in one a secondary growth was discovered in a retroperitoneal lymph-node.

The problem of treatment is to find some substance which will exert a destructive action upon the malignant cell, while the other cells of the body remain uninjured; but the difficulty of discovering such an agent becomes more and more evident as we constantly fail to detect any distinct difference between malignant and normal elements, with the one exception, so far known, that the cancer cell usually possesses the power of continuous growth within the body. It has not been demonstrated beyond discussion that radium exerts a selective action upon the cancer cell, though its general cauterizing power is recognized, nor has chemotherapy yet offered anything of value; immunity also has proven a barren field, since the existence of anything in the nature of an antibody has never been clearly shown.

Surgery, therefore, offers at present the only rational method of combating the disease. The hope of substituting some specific means of treatment for this crude and only too often ineffectual procedure is based on the observation that transplanted tumors, and in a few instances even spontaneous growths, have been known to recede, although there is still no indication of the manner in which this process takes place. Accordingly, although many of the results of ten years' investigation have been negative in so far as immediate applicability is concerned, they have at least fully demonstrated the utter hopelessness of temporizing with malignant disease, and the imperative necessity of early and thorough removal.

A metastatic growth in a superficial lymphatic gland or a gland of the skin may sometimes deceptively simulate the appearance of a sebaceous cyst. In a patient suffering with a malignant neoplasm, therefore, the development of a "wen," especially if at an unusual situation, should be regarded with sufficient suspicion to prompt investigation of its interior.

THE EARLY DIAGNOSIS OF CARCINOMA OF THE UTERUS.

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(From Columbia University, George Crocker Special Research Fund, F. C. Wood, Director.)

Early diagnosis of carcinoma of the uterus implies the possibility of permanent cure; late diagnosis, on the other hand, means that the patient reaches the surgeon in an inoperable condition and that palliative measures alone can be attempted. The necessity for trying to obtain early diagnosis in cases of cancer of the uterus, or, in fact, of cancer in any portion of the body, is made evident by the observation that our results in cancer, particularly cancer of the womb, are not very encouraging. The fact that so many medical societies and individual gynecologists have attempted by propaganda to enlist the assistance of both the profession and the public, shows that honest attempts to catch the cases early have not been wanting. Lay bodies, likewise, have encouraged attempts. In spite of this, however, the actual results obtained have hardly shown improvement. The man who has most carefully studied the subject of propaganda and practiced it is Winter of Königsberg. As will be noted from his researches and those of others, a great many women, particularly those of the neurasthenic type, are frightened by the leaflets which they receive, while actual or potential sufferers from the disease are apparently more rarely reached. To expect the public at present to submit to bi-yearly prophylactic examinations is too Utopian a dream. Furthermore, it is no exaggeration to say that many general practitioners are unable to make a diagnosis of carcinoma of the uterus unless the symptoms are well marked and the disease advanced. Those women who are stolid in type, or those who are busy in their household or in their professional work, rarely pay attention to the beginning symptoms of cancer, particularly as cancer so rarely produces pain until it is far advanced. Moreover, the old deeply rooted idea that irregularity of menstruation is the rule and not the exception towards the time of the menopause has doomed countless women to lingering and painful death. The aversion to an examination while bleeding, arising partly from delicacy, partly from the fact that some physicians habitually refrain from examining patients while they are bleeding, has often been the cause of the waste of precious days, weeks, or even months. Only when the bleeding becomes constant, continuous, increasing in amount, when foul discharge makes life unbearable to the sufferer, and when pain produced by the progress of the disease through the invasion of neighboring organs, grows more marked, and, finally, intense, do some of these women seek medical advice. Needless to say, the condition has then progressed far beyond the hope of cure, and palliative treatment alone is to be thought of. While palliation of such hopeless suffering is, of course, most necessary, our main efforts should be directed toward early diagnosis, which at the same time implies permanent cure. Not only the laity, but also the medical profession, must cooperate; yet I will confess that even such cooperation is unable to save more than a small number of women.

The propaganda must be continued without interruption and without slackening in private practice, in hospitals, in dispensaries, in social gatherings, and in whatever places it is feasible. The medical profession, on the other hand, must be trained from the bottom up. Apparently, there is a not inconsiderable number of doctors who, after they leave the medical schools, acquire no further knowledge, and, therefore, great care, great emphasis, and continual effort must be directed toward teaching the medical student.

Perhaps, considering the great influence that magazines and women's weekly journals exert among the lay public, it may become necessary to transfer a part of the propaganda to the press, to have popular articles published in the weekly and monthly journals. The danger of such a procedure lies in the fact that the neurasthenic class, to which reference has previously been made, will most probably respond in too great degree to the newly acquired knowledge, and will flood the medical profession with useless fears. If, however, only some of the energies at present expended in suffrage propaganda, in twilight sleep campaigns, etc., can be directed toward disseminating information on the prophylaxis and early diagnosis of cancer of the uterus, a good deal may be accomplished.

Turning now to the purely medical aspect of the question, there is no disguising the fact that many physicians either fail to examine their cases vaginally before marked symptoms develop, or, even if an early vaginal examination is made, are incapable of diagnosing the condition. The question naturally arises: Is the diagnosis of cancer difficult? Unquestionably there are very many cases, indeed, that require skill, practice, and judgment. Among them are especially those cases in which the cancer develops within the body of the uterus. Fortunately, however, this type of cancer is the least malignant of uterine cancers, and, therefore, if weeks or even

months are allowed to pass before the correct diagnosis is reached, no great harm results.

On the other hand, in cancer of the cervix and, to a certain degree also, of the vaginal portion of the cervix, every minute of delay is costly. The way to diagnose cancer of the uterus early is to be on the lookout for it in every suspicious case. The way to change mere suspicion into certainty is by excising small specimens of the cervix or curetting the canal, removing suspicious particles or ablating polypi, and at once submitting these specimens to microscopical examination. The preservation of such specimens will be referred to later. In these days of numerous laboratories, of rapid communication, of parcel post, not more than a few hours, or at most days, separate the most outlying isolated communities from some scientific center. Consequently, no excuse is valid for neglecting to have suspicious specimens examined by a competent pathologist. In many of the larger cities, institutions of research, boards of health, or medical schools volunteer their services in the case of impecunious patients; so that lack of funds is no bar to this examination. The true bar, and I do not propose to mince my words, is either the inertia or the ignorance of the medical practitioner. Too many physicians when confronted with suspicious erosions or enlargements of the cervix console themselves and the patient by talking of lacerations, of hypertrophy, and of inflammation, wasting precious weeks and months in tampon treatment, in applications of iodine, in douching, etc., instead of curetting or excising one or more suspicious spots and submitting the specimen to the pathologist. Only too often, if the uterus is curetted, the scrapings are thrown away without being examined microscopically. I often think that if only some of the energy wasted by practitioners in curetting post-abortum or post-partum could be directed into the proper channels, and their investigations confined to cases suspicious of cancer, much good would accrue to the human race.

The only way to safeguard patients against the danger of cancer is, I repeat, to be constantly on the watch for this disease. No age is exempt; I have seen cancer of the cervix in a girl of 18. No symptom is pathognomonic. Hemorrhage may be due to fibroids, to purely functional conditions, such as overactivity of the ovary, or to inflammation of the cervix, of the body of the uterus, or of the adnexa. Discharge, likewise, may be due to gonorrhea, to other inflammations either acute or chronic or even to functional hyperactivity of the ovary reacting upon the uterus. Pain, as previously mentioned, is a late sypmtom in cancer. As will be seen from the preceding list of possible symptoms, the patient may consult the physician for one or more complaints. The symptom complained of in the case of a woman who watches herself carefully may be simply a slight, badly smelling leucorrhea, a small amount of bleeding after coitus, or a sight spotting between periods. On the other hand, a careless and stolid woman will not seek medical advice until the leucorrhea is foul, or until the hemorrhage is profuse and continuous. Her chances of radical cure will be less than those of the more observant patient. Other things being equal, the patient who seeks or is fortunate enough to find a wideawake and well trained physician will also run a better chance of cure.

Let us now take up seriatim the symptoms enumerated and see in how many cases they can be differentiated from other conditions.

A *foul-smelling leucorrhea* is very rare in conditions other than cancer, though gangrenous polyps extruding from the cervix, severe, neglected gonorrheal infections with dermatitis of the vulva, or venereal warts, may possibly produce a foul discharge. With these exceptions, it is almost always due to carcinoma.

Bleeding, on the contrary, is a symptom difficult to differentiate. Profuse bleeding is seen in cases of fibroid of the uterus. Here it begins usually as a profuse menorrhagia, becoming irregular in type only as the disease progresses. Furthermore, the irregular enlargement of the uterus is usually characteristic. If doubt exists, and the question of differentiation between carcinoma of the body and fibroids of the uterus arises, a diagnostic curettage must be performed, the curettings being carefully examined under the microscope. If profuse and irregular bleeding occurs without marked enlargement of the uterus, the diagnosis lies between a so-called "chronic metritis" (or hyperplasia of the various layers of the uterus, also called "fibrosis uteri," uterine "sclerosis," etc.) and corpus carcinoma or carcinoma of the cervix high up in the canal. Again the curette will give the proper differentiation. The sole contraindication to be considered before curetting a bleeding patient is inflammation, which may also produce irregular bleeding. However, unless the inflammation is quite acute, the damage done by the curettage is not irreparable. On the other hand, an acute inflammatory adnexal disease could but rarely be confused with cancer, even by the ignorant. In inflammation, pain, distributed throughout the pelvis and making a thorough pelvic examination almost impossible, is the rule. Fever, peritoneal symptoms, vomiting, etc., are also almost invariably encountered.

Pain need not be discussed in this connection, because when this symptom is due to cancer, the case will usually have long passed the early stage.

Suppose now that a practitioner is confronted by a patient who gives one or more suspicious symptoms, or in whom because of the advanced age of the woman, he is on the lookout for cancer. How shall he demonstrate the condition, if present, or absolutely exclude it, if absent? Naturally a vaginal examination must be made to determine the size, position, and mobility of the uterus, the size, softness, or hardness of the cervix, the presence or absence of bleeding when the cervix is touched, the palpability of the adnexa, and the mobility of the pelvic organs. This examination in itself demands a considerable degree of skill, and if such skill is possessed by the examining physician he will at once be in a position to know whether the uterus as a whole is enlarged or not. Considerable enlargement of the uterus will speak (though not with absolute positiveness, because the two conditions may coexist) against carcinoma, and in favor of fibroids. If the fundus is small, movable, and uninvolved, while the cervix is large, the bleeding will probably be due to some new growth of the cervix.

The vaginal portion of the cervix, the "portio" so-called, for short, is, of course, accessible not only to the finger but also to the eye. Gross changes in its appearance are readily visible, but their interpretation is not always simple. Ulcers of various origin, such as those due to irritation of a pessary worn for a long time, or arising from a primary syphilitic infection, from tuberculosis, or from various less well defined infective causes, often leave even the most expert in doubt, and definite decision can be reached only after excision and examination of a specimen. Certain changes in the cervix are, however, quite characteristic, not only to the finger, as localized hardness, but to the eye, such as cauliflower projections and wart-like or velvety growths, in which the color, the readily caused bleeding, the friability of the tissues, etc., are quite characteristic. Adeno-carcinoma within the cervical canal can sometimes escape cursory inspection and examination, since the os externum and the vaginal portion of the cervix may appear quite normal, although the growth within the cervical canal has reached considerable proportions and has formed a hollow, crater-like structure within the canal proper. Under such circumstances, the entire cervix, particularly the portion felt above the vagina, will appear enlarged, boggy, and resistant, will be hard to differentiate from the surrounding tissues, and will prove immovable when attempts to raise the uterus are made. The diagnosis can at once be made, however, if the external os is slightly dilated with a Hegar dilator and a small sharp spoon or small curette is introduced, because quantities of necrotic material will come away readily at the slightest touch of the curette, and these, if not macroscopically characteristic, can easily be recognized after sections have been made. This type of case, which, of course, is no longer an early one, is most likely to escape attention at its inception, because at the beginning of the disease a small amount of "meat-water" discharge will be the sole subjective symptom, and a slight infiltration of the pericervical tissues the sole objective sign. Should the physical examination prove unsatisfactory to the beginner in medicine or to the less expert general practitioner, it is far wiser to seek early consultation, even should the case prove non-malignant, than to take even a small chance of gravely or perhaps irreparably jeopardizing the life of the patient by procrastination.

From what has been said, it must be apparent that the most dangerous type of carcinoma of the uterus is that occurring inside the cervical canal. Carcinoma of the body of the uterus early produces irregular bleeding, is not very malignant, and even if neglected for a time can often be cured by operation. This type of growth occurs quite frequently at or after the menopause, so that patients report that their periods have become scant or have ceased. When tumor formation takes place, irregular profuse bleeding occurs and this may remain the sole symptom, though foul discharge and uterine enlargement may also develop. Cancer of the portio vaginalis, on the contrary, is subject to numerous traumata, such as those arising from coitus, douching, and vaginal examinations, and ought, therefore, to be discovered fairly early in its course. Cancer within the cervical canal however, is protected from external insults to a great degree, and is hidden from inspection until the external os is passed, and, at best, the growth has but a thin shell of uterine tissue between it and the surrounding tissues, the parametria. Early extension in this variety of tumor is, therefore, the rule.

Turning now to the material obtained either from curettage of the uterus or cervix or from excisions, there are a few points which require emphasis. The specimens should at once be placed in 5 per cent. formaldehyde, and after due fixation and impregnation should be cut into thin sections. Personally, I much prefer paraffin sections to those prepared by the celloidin method. Any good nuclear stain, if not too dark, will answer the purpose.

In early, doubtful cases considerable skill and experience are necessary in order to arrive at the

correct diagnosis. Much can be accomplished by a careful survey with low magnification, since the general appearance of the growth, its invasive distribution, the breaking through the basement membrane of the acini, and similar characteristics, are more apparent with the low than with the high power. After these main points have been studied, the higher power will show the type of cells in the growth, the presence or absence of mitoses, irregular nuclei, and other atypical formations. If curettings from the uterus are submitted for examination, it is highly important to see that a small quantity, at least, of each portion of the curettings is included in the sections, because at times only small particles of the growth reach the pathologist, and unless he makes a rule of examining parts of the entire mass submitted, he may well miss, for instance, a small adeno-carcinoma of the tubal angle. In examining excised portions of the cervix, it is extremely important that the sections be made exactly at right angles to the surface, since oblique sections through the epithelium sometimes closely imitate in appearance carcinoma of the squamous type, and should "benign epithelial proliferation" be present at the same time, the resulting confusion may make a correct diagnosis impossible.

In examining sections from the uterus difficulty may arise in differentiating marked glandular hyperplasia and "adenoma malignum" so-called, that is, adeno-carcinoma. However, even a moderate degree of practice should make it possible to eliminate the non-malignant condition. Excisions from the portio vaginalis are much more difficult to diagnose. Here erosions or small papillomatous growths or warts may very closely simulate malignancy. Therefore, in these cases in particular, thin, well-stained sections are absolutely essential. Should question arise in a given case, it is far wiser to submit the sections to other, more experienced pathologists than to attempt a snap diagnosis and take the risk either of suggesting hysterectomy in a non-malignant condition, or of allowing a still operable carcinoma to become inoperable by advising delay.

In this short and perhaps superficial paper, I have attempted to show that cooperation of the patient, the practitioner, and the laboratory pathologist is necessary. A slip in any of these links of the chain may result in grave danger to or in the death of the patient. To attain the desired results, patients must be instructed by propaganda, and physicians must be taught in the medical schools, and their memories constantly refreshed after they have entered practice. Essentials are: To make early and careful examinations; to think constantly of cancer as a possibility; to know the signs which these new growths produce; to make frequent use of diagnostic excisions or curettages; and to call on the pathologist as an aid.

THE IMPERATIVE NECESSITY OF EARLY DIAGNOSIS AND EARLY OPERATION IN CANCER OF THE FEMALE BREAST.

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AN INDICTMENT.

Practically one-half of all the women who to-day die of cancer of the breast do so needlessly. Surely a terrific toll of life sacrifice.

THE PROOF.

It must be admitted that up to the present time surgical intervention alone has presented evidences of *any* real value in the cure of cancer, evidences backed by scientific diagnosis and followed relentlessly to final endings. Many agencies have been patiently tried, and all surgeons have hoped for some non-operative cure. But thus far no answer has come to our prayers. Until the day of such discovery dawns we are hence obliged to consider surgical intervention the only hope of saving the lives of any of the many victims of cancer.

What, then, has surgery proven? In 1907 the American Surgical Society presented a careful analysis of the end-results of operations for cancer of the female breast. The thoroughly investigated results of several of our largest surgical clinics were presented, and also the individual statistics of a large number of surgeons of widest experience. These statistics can be found in detail in the published transactions of this society for that year, and will not be stated here. Suffice it to say that, in general, these studies show that to-day under modern surgical methods from 25 to 40 per cent. of cases operated upon are permanently cured. These results are not brilliant, but they are at least encouraging. In the critical analysis of these cases, however, a more important fact was noted by several clinics. For instance, in the Johns Hopkins clinic the general average of cures was 42.4 per cent. In this same clinic, however, *in cases operated upon before glandular metastasis had taken place 85 per cent. were cured.* Crile's statistics showed only 14 per cent. of permanent cures where glandular involvement was present, but 80 per cent. of cures was obtained in cases operated before extension to the glands. Similar results were reported by several other surgeons who presented contrasts on the

basis of the period of operation. In other words, the prospect of permanent cure was twice as great where cases were operated upon early. When we also consider the mortality of cases coming to the surgeon too late for operation to be even considered, we are more impressed with the enormous percentage of unnecessary mortality. We are certainly justified in saying that to-day in operated and unoperated cases at least 75 per cent. of all women with cancer of the breast die of the disease. In contrast, if every case of cancer of the breast were operated upon in an early stage, at least 75 per cent. would be permanently cured.

Conclusion: At least 50 out of every 100 deaths from cancer of the breast could be avoided, therefore, if only the cases were operated upon early enough. Surely, therefore, the responsibility of early diagnosis and early operation is enormous. As William Francis Campbell, of Brooklyn, has so forcibly said, "Given a patient with cancer of the breast in the first state, consulting a physician on its first detection, the fate of that woman is in the hands of the doctor whom she first consults, provided she follows his counsel."

DIAGNOSIS.

Lump in breast: In practically all cases of cancer of the breast, the first evidence is a lump or tumor in the breast. This has been the case in at least 95 per cent. of all our cases. In most cases this lump is accidentally discovered by the woman, and is without attendant pain or discomfort. In only about 5 per cent. of cases is the lump in its early stages either preceded by or attended with pain. This fact should warn us against the folly of expecting or waiting for pain as an evidence of cancer. It is generally a quite late sign, one often manifest only when the disease has so far advanced "that a wayfaring man, though a fool, could not err" in diagnosis. Therefore, when a woman presents herself for examination for a lump or tumor in the breast, we should at the outset bear in mind certain most suggestive historical facts:

(1) *Statistics of tumor malignancy:* We should know that extensive statistical records have proven that from 80 to 90 per cent. of all tumors of the breast are malignant. According to Billroth's statistics, embracing 440 cases, 82 per cent. of all tumors of the breast are cancer; Schmidt, of Heidelberg, found 82.66 per cent. malignant; Bryant, 83.16; Gross, 82.47. The author of the chapter on breast tumors in Von Bergmann's "Surgery" states that, in his clinic, of 359 tumors of the breast, 306 were carcinoma, or 80.9 per cent.; thirty-four were sarcoma, 9.1 per cent., making the total of malignancy 90 per cent., while but nineteen of the series were benign growths. Jonas, of Omaha, in a recent report embracing 260 cases from his experience, found 218 cases, or 87 per cent., malignant and forty-two, or 13 per cent., benign.

When it is further remembered that many cases apparently benign at the outset finally undergo or manifest malignant development, the figures become most impressive. C. H. Mayo tersely remarks 'that 80 per cent. of all breast tumors are primarily malignant; that of the remaining 20 per cent. of primarily benign growths, one-half ultimately become malignant, raising the final percentage of malignancy to 90 per cent., and that the remaining 10 per cent. must be viewed with great suspicion."

(2) *Age:* Cancer of the breast is, generally speaking, a disease of middle life, the average age, according to Crile, being 49. The complete statistics of the Massachusetts General Hospital show, of a total of 309 cases, five occurring between the ages of twenty and thirty; fifty-six between thirty and forty; 120 between forty and fifty; 107 between fifty and sixty, and twenty-one between seventy and eighty. It is also noteworthy here that while cancer of the breast is quite rare under thirty, yet it does occur. On the other hand, it is quite probable that most malignant tumors show themselves at an early age in the woman's life. Indeed, I feel that we may generally assume that a tumor in the breast of a woman under thirty years of age, except with pathognomonic evidence of malignancy, is probably benign, while after we pass this age the probability of cancer becomes so much greater that we will be much safer in assuming malignancy as a fact.

(3) *Heredity,* on which in the past much stress has been laid, is of little importance, and in only about one-third of our cases can an heredity history of cancer be found.

(4) *Lactation factors* likewise are of little significance, since, according to Crile, 35 per cent. of his cases had not borne children and in but 11 per cent. was there distinct a history of lactation complications. It is quite probable, however, that chronic mastitis has something to do in producing a favorable nidus for cancer, as is true in chronic inflammation elsewhere.

(5) *Injury* likewise has some influence, but is of too little importance to be significant. In fact, it is too easy to find a history of injury antecedent to any condition to which the human flesh is heir, if we but ask for it.

Giving whatever weight we wish, however, to these data, we are finally forced back to physical findings for correct diagnosis in a given case.

Physical examination: Palpation, therefore, becomes probably our most accurate recourse in diag-

nosis. The intelligent manipulation of a hand trained in the sense of touch is of paramount importance. For the exercise of this faculty it is essential that the flat of the fingers and palm of the palpating hand should be pressed gently down upon the breast and the tumor thus defined between the hand and the unyielding chest wall behind. Pinching up the breast between the fingers has doubtless led to many fallacies, ofttimes, I am sure, leading to the removal of mammary glands in which there was actually no disease present whatsoever. When we remember that the breast is a lobular organ, it follows that in pinching up a breast, as I have seen many do, we can find an apparent tumor, certainly a mass in all. With the hand or fingers flatly applied to the chest, however, and gently compressing the breast between it and the bony wall, then moving the breast beneath horizontally over the underlying ribs with the skin fixed by contact with the hand, any existing tumor, even though small, can be detected with surprising ease and accuracy. The nodule may be exceedingly small, yet the stony hardness of a cancer growth will be striking and characteristic. Careful comparison in all manipulations should be made with the healthy breast, though here it should be remembered that bilateral disease, while infrequent and therefore improbable, is not impossible. A carcinomatous tumor is generally single, and multiple tumors speak against malignancy. The cancerous growth likewise infiltrates the normal breast tissue, and this not being circumscribed, it moves with the breast in which it is definitely fixed. It is also quite apt to become fixed early either to the skin overlying, in superficial growths, or to the pectoral fascia beneath, in deep-seated growths. The skin attachment is easily recognized. The fascial attachment may become evident only when the arm is carried upward and outward, rendering the pectoral muscles tense. Then ofttimes the tumor and with it the breast become absolutely immobile on the chest wall. It is also important to observe the relative amount of normal gland remaining outside the area of the tumor. Inasmuch as the cancer grows at the expense of the breast, and fibrous tissue contraction accompanies the process, there is often but little normal gland tissue left. The extent of this ratio is often also an evidence of the rate of growth, which may be of service in prognosis as well as in diagnosis. In simple tumors, on the other hand, the normal breast tissue is pushed aside, but not consumed.

The tendency of the fibrous tissue trabeculae to shorten and thus fix the breast may also give visual evidences even at a very early stage of the disease, in the slight dimpling of the overlying skin evidenced by moving the breast over the chest wall, producing also a sensation of tugging to the examining hand. Halstead especially lays great stress on this sign, even going so far as to say that "the faintest conceivable trace of a difference on the two sides in a minor pectoral crease, for example, may suffice for the diagnosis. Frequently there is no sign, but this almost imperceptible suggestion of pull, which, when the faintest possible, is, of course, elicited by dislocation in one direction only. This sign, however slight, is all that is needed for the diagnosis." Surely, however, we must remark, extreme care must be taken in this test, and only an experienced examiner of breast tumors could follow the refinement of Halstead's test in its entirety. When well developed, however, it is surely trustworthy. Minute comparison of both breasts is, of course, essential.

The sign of retraction of the nipple, on which so much reliance was formerly put, is not now given so much prominence. In some subjects it will be found that this characteristic is found normally and is then present in both nipples. When present in one nipple alone, it is still a highly significant sign. Its absence, however, is of little value in negating a diagnosis. In fact, Crile found it present in only 33 per cent. of his cases. It must be remembered that this sign is likewise dependent upon shortening of the trabeculae, and unless the growth is in the central area or quite near the nipple, no retraction will occur except in a large or well-advanced cancer.

The fat overlying a cancerous nodule, if it be superficial, is ofttimes absorbed, also lessening the freedom with which the skin moves over the tumor and ofttimes making the tumor stand out so prominently as to be at once apparent to the inspecting eye. In early diagnosis, particularly in that of deeply seated nodules, it is valueless.

The involvement of the axillary glands and their enlargement come sooner or later, alas often too soon. It is to be remembered that acute inflammation, tuberculosis, etc., can likewise produce enlargement of the axillary glands. The local evidences of infection and inflammation, however, are usually so easily recognizable in these diseases as to lead to no confusion in their differential diagnosis. With these inflammatory causes set aside, the evidence of enlarged axillary glands is quite conclusive of cancerous disease. In fact, the diagnosis should be made before this symptom is evident.

Ulceration, emaciation, and cachexia are such late evidences as to be of no service to a clinician. By the time these symptoms are manifest, a housemaid could make a diagnosis.

Operative diagnosis: After, however, all is said as to physical diagnosis, and all the various diagnostic signs have been fully exhausted, we must yet admit the fact that in many cases preoperative absolute diagnosis is impossible. This is particularly true in the earliest stages of the disease. And here is to be found, therefore, the somewhat plausible excuse for a course of hesitation, palliation and delay, so fatal in the end to the unfortunate woman. When, however, we reflect that even a benign tumor never disappears except by removal; when we remember that, from the aspect of general probabilities alone, the chances are nine out of ten in favor of malignancy; when we realize that a simple incision will make a diagnosis absolutely clear, is there then left any possible excuse for the responsible physician to counsel a course of procrastination which, as we have shown, probably robs the sufferer of one-half her chances of life?

We would insist, therefore, that every case of tumor in the female breast should be submitted to operation the moment it is first detected. Through a simple incision of the Warren type, with but little scar, the tumor can be exposed, excised and by immediate examination a positive diagnosis will be obtained. With Bloodgood we believe that in most instances the diagnosis will readily be made by the experienced surgeon from the mere gross appearance of the tumor after incision. If any doubt exists, however, a competent pathologist should be at hand for the immediate microscopic diagnosis of the tumor by frozen section. This proceeding will occasion a delay of only from five to ten minutes and will furnish a practically exact diagnosis. In our experience, the possible error from frozen section diagnosis is absolutely immaterial if the pathologist is experienced and competent. We cannot too strongly condemn the policy, once in vogue, of excision followed by delay for fixation of specimen and later diagnosis followed by secondary radical operation should cancer be found. Halstead has shown in his Johns Hopkins researches that in no case of cancer of the breast in which this delay was permitted has a final cure followed. When the tumor is once cut into operation should be completed either as a simple operation for a simple tumor or as a radical one for the cancer at this primary operation. If the tumor proved benign, without risk to the patient, without multilation and with only an insignificant scar, the patient has been relieved of a growth which could not have been otherwise dissipated, and which as long as it remained constituted a menace from possible secondary malignancy. On the other hand, should the tumor prove malignant, this early recognition and early radical treatment will have raised the chances of that woman's life from 25 or 40 per cent. to 75 or 80 per cent.

Certainly with these evidences to-day one is practically following a criminal course who does not insist upon the immediate exploration of every tumor in a woman's breast as soon as it is first found.

CANCER OF THE BREAST.

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Excluding uterine and gastric carcinomata, the breast ranks highest as a favorite site of malignant neoplasms. If it be granted that the only cure for mammary carcinoma consists in the application of radical surgery, it naturally follows that diagnosis should be perfected, and the patient subjected to operation at the earliest possible moment.

While under ordinary circumstances it would appear that there should be little difficulty in the diagnosis of mammary carcinoma, instances are many where it is impossible to definitely determine before operation whether the neoplasm is malignant or benign. In considering mammary tumors, one must constantly bear in mind that the mamma is composed largely of glandular tissue that is subject to periodic activity and stimulation, and that benign neoplasms in this situation are especially prone to undergo malignant transition. With this knowledge, and based upon practical experience, I have become convinced that as soon as discovery every mammary tumor should be surgically removed, regardless of the age of the patient and the apparent clinical benignity of the growth. There are, however, certain mammary neoplasms which can usually be recognized as benign, and others which can be almost certainly diagnosed as malignant. Those which have given me the most concern are the so-called borderline tumors, such as intracanalicular, papillo-fibromata, adeno-cystomata, and, in certain cases, even the simple cystomata. What shall be advised in borderline cases where there exists definite pre-operative diagnostic uncertainty? The best interest of the patient would hardly seem to be conserved by radical extirpation of the breast in every case where non-malignancy is not absolutely certain, although personally if my suspicions of malignancy were sufficiently strong, I would not hesitate to advise the radical procedure.

In every instance the mammary gland or the extirpated tumor should be subjected to careful microscopical scrutiny to definitely establish the diagnosis,

and if non-malignancy be shown, the patient should be so informed, as nothing could be more unfortunate than for a woman to be impressed with the probability of recurrence after removal of a mammary tumor. I believe there are many instances in which presumably malignant mammary neoplasms have been removed and not subjected to microscopical examination, the operator being satisfied of malignancy from the gross appearance noted upon incising the specimen after extirpation; also that in many instances where patients have recovered without subsequent recurrence after removal of mammary tumors by either simple excision or radical extirpation, the microscope would have shown that the neoplasms were not malignant. However, I would not be understood as advocating operative delay until the diagnosis can be made absolutely, as undoubtedly the greatest good to the greatest number will be subserved by occasionally sacrificing non-malignant breasts rather than by failure to radically remove a single malignant tumor in this situation.

Wherever it is possible, should there be any doubt in the mind of the surgeon, the tumor should be subjected to immediate microscopic examination by frozen section, before proceeding with the radical removal. There is little danger of fresh fields being contaminated by carcinoma cells if the preliminary incision be immediately cauterized; and whether it is believed the neoplasm be carcinomatous or otherwise, where a section is removed for microscopical examination, the knife should always be directly followed by the cautery to prevent possible entrance of carcinoma cells into subjacent tissues, provided malignancy is proved. The surgeon of wide experience can make the diagnosis of carcinoma in most cases after preliminary incision, by the sense of touch and appearance of the tumor, without the aid of the microscopist; but although few mistakes may be made, the post-operative employment of the microscope is necessary not only for the benefit of the patient, but also for that of the surgeon in his future conduct of the case as regards watchfulness for recurrence, prognosis, etc. An important feature which should be remembered in connection with microscopical examination at the time of the operation is that certain portions of a mammary tumor may be malignant or undergoing malignancy, whereas the section subjected to the microscope may be perfectly benign; this has been found notably true in adenomatous neoplasms and "involuting mastitis."

In the diagnosis of mammary carcinoma, the so-called "cancer age" must be always borne in mind. Mammary neoplasms in women who have arrived at the cancer age should invariably arouse suspicion of malignancy; in young women cancer also sometimes occurs, but in them the percentage of carcinomata among the mammary tumors is much smaller. Pain, fixation of the skin, as evidenced by the so-called "pig-skin" appearance, retraction of the nipple, and secretion from the breast, are all indicative of probable malignancy.

In determining the presence or absence of a mammary tumor, the patient should be stripped to the waist and examined both sitting in a hard-back chair and in the recumbent posture, both breasts being exposed and compared as to size, consistency, appearance, etc. Tumors or irregularities in consistence may be most easily discovered by using the entire palm of the hand in palpation.

The diagnosis of probable mammary carcinoma having been made, what should be the method of procedure? I believe it is generally agreed that the only curative treatment thus far discovered for carcinoma is radical excision by the knife; this applies regardless of the situation of the tumor, with the possible exception of skin epitheliomata, which may sometimes be successfully removed by the actual cautery, by repeated applications of corrosive pastes, etc. Immediate radical extirpation should be undertaken of every mammary carcinoma, no matter how small nor how extensive the neoplasm, unless the case be deemed inoperable from the standpoint of probable cure. Every mammary carcinoma classed as "operable" should be subjected to radical removal by the knife.

My conception of radical extirpation is a procedure which contemplates not only removal of the breast, but also both pectoral muscles, the infraclavicular and axillary glands, the fatty contents of the axillary space, and the lymphatics just beneath the edge of the scapula. The incision should circumscribe the breast wide of the nipple, extending progressively wider as the deeper tissues are penetrated. By no other method of procedure may one hope to effect a permanent cure. The mere removal of the breast together with the pectoral fascia and axillary lymphatics, particularly by finger dissection, is never sufficient to insure enduring relief. The incision should begin in the axilla and the blood-vessels be controlled first; in this way the procedure is markedly simplified and much less blood lost by the patient. The plan suggested by Rodman has been found a satisfactory and easy method of approaching the axilla for preliminary ligation of the vessels before extirpating the breast. He has emphasized the importance of removing all the fascia and muscles, even a portion of the fascia

of the rectus abdominalis. Even with the wide skin incision recommended, it has not been found necessary in my experience to use skin grafts, nor has there been difficulty, excepting in one instance, in bringing the edges of the incision together. This can always be accomplished if the skin is dissected sufficiently far backward to make a sliding flap. It must be remembered that in operating for mammary carcinoma, cosmetics are entitled to no consideration.

Post-operative *x*-ray treatment should be commenced immediately after removal, whether glandular involvement has occurred or not. Where adjacent lymphatics are extensively implicated, the patient should be subjected to the *x*-ray treatment on alternate days extending over a period of about three weeks.. Where there has occurred considerable axillary glandular involvement, it is my practice to leave the axilla open until the patient has received six *x*-ray treatments of rather high amperage, *i.e.*, enough to "sun-burn" the skin, and then close the remaining portion of the wound by Michel clips.

My observation has led me to believe that where supra-clavicular involvement has occurred, notwithstanding the fact that these glands may be removed in toto with the breast after resection of the clavicle, recurrence is almost certain, and this class of cases must invariably be considered as inoperable from the standpoint of ultimate cure.

Within the last three years all my operations for mammary carcinoma have been performed under gas-oxygen anesthesia and the anoci-association method of Crile, which I regard as one of the most important advances in surgical technic within recent years. Under this method of procedure the patient suffers absolutely no post-operative pain, there is no shock from the operation, no post-operative nausea, no vomiting, and the patient can usually leave the bed within forty-eight hours.

During the last seven years I have operated upon many patients for mammary carcinoma, of which forty-eight were in private practice, the remainder in municipal hospital work. In every case the clinical diagnosis was confirmed by the microscope and the radical operation was performed. Eighteen of the forty-eight private patients are still living after three years, as are also a number operated upon less than three years ago. Eight are living without recurrence or metastasis after the expiration of five years.

Fourteen patients died of local recurrence or metastasis; one died of liver metastasis; one of mediastinal recurrence; three of spinal metastasis; one of pleural metastasis. One patient still living three years after the original operation had a recurrence in the scar, which was removed and followed by *x*-ray treatment, with no further evidence of the disease. Two of the patients, after two and three years, respectively, developed carcinoma of the remaining breast, which was also radically removed. One of these patients later died of tuberculosis, the other is still living now between three and four years since the last operation.

One patient returned with metastases involving the left parietal and left maxillary bones, and the second lumbar vertebra, the body of which has almost entirely disintegrated. Another, operated upon two years ago, returned within the last week with supraclavicular glandular involvement of the opposite side, which is probably carcinomatous in character. The structures above the breast are infiltrated and there is probably mediastinal involvement, although this has not yet been positively determined by the fluoroscope.

In four cases, then, vertebral recurrence has been noted, the patients coming under my observation the second time—one with the diagnosis of "rheumatism" and the other three "sciatica." The fact is emphasized by these four cases that the development of "rheumatic pains" in the hip, back, legs, etc., a year or more after the excision of mammary carcinoma should always be regarded as suspicious of spinal recurrence. The *x*-ray is a most important diagnostic agent, particularly where the disease recurs in the vertebral column.

400 ATHERTON BUILDING.

PAIN AND RETRACTION IN BREAST CANCER.

Nearly all physicians depend upon two signs in cancer, which frequently, even in advanced cases, are not present at all. One is pain and the other is retraction of the nipple. Pain is almost invariably absent for the first year or more of cancer of the breast. I do not know of any condition about the breast that is as painless as cancer. Benign growths, cysts, and involution mastitis, all give more or less pain. Cancer gives none. Retraction of the nipple, at the very most, occurs in 51 per cent. of all cases.—WILLIAM L. RODMAN, in the *Pennsylvania Medical Journal.*

Multiplicity of tumors of the breast usually speaks against carcinoma.

EARLY RECOGNITION OF MALIGNANT DISEASE OF THE BLADDER AND OF THE PROSTATE: OPERATIVE THERAPY.

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(From the Surgical Department of Mount Sinai Hospital.)

Malignant disease of the bladder and of the prostate rarely induces symptoms until the early stage in the disease is passed. It is for comparatively "late" symptoms that the patient consults his physician. The recognition of the trouble at this stage is all that we can expect to accomplish, though occasionally in the course of a routine examination we may discover a malignant growth, which had given very few if any focal symptoms. (A patient may complain of lumbar pains and on cystoscopic examination we find that a carcinoma has shut off the corresponding ureter. Such a diagnosis might be very early in the career of that particular tumor, and its recognition at that stage would be accidental; again, in the course of a cystoscopic examination for some other indication, a tumor may be encountered early.)

If every patient who had suffered from an unsatisfactorily explained hematuria were cystoscopically examined, benign and malign growths in the bladder would come under treatment at a much earlier period than they do at present. The same applies to cases of intractable pyuria. Moreover, if the routine examination of patients included a rectal examination of the prostate, slight irregularities in the organ, areas of induration, asymmetries, would assume a significance which at present they do not enjoy.

Bladder Carcinoma: Experience has shown that in the great majority of cases of papillary vesical neoplasms we can determine whether we are face to face with a benign or with a malign tumor. A benign papilloma is usually very frankly so, and is readily recognized by the experienced cystoscopist in the great majority of cases. There is also very little trouble in recognizing a frankly malignant papilloma (or a flat carcinoma), with infiltrating edematous base and more or less necrosis of the thick papillae. Between these two extremes even the most careful observer may have great difficulty in deciding what he is looking at. In these cases, I believe we all will occasionally go wrong, and temporarily misinterpret our cases. I can recall one patient with four papillary tumors in the anterior bladder wall, who had been treated with the high frequency current for seven months by a leading specialist. I attempted the same therapy and, getting no result, I exposed the bladder by operation, on the suspicion of carcinoma, and much to my surprise found that the whole bladder was so infiltrated that a cystectomy had to be done. Here the comparatively innocent looking papillomata, which did not respond to the therapy, and which, by the way, showed carcinoma under the microscope, were the only visible expression of the extensive disease.

To avoid such errors in diagnosis, I feel that we must rely upon the microscopic study of excised pieces of the suspicious growths. This excision should be made at the first or second cystoscopy, and pieces as near the base as possible should be cut away. Parts that look like frank papilloma should not be excised, but those areas that look suspicious. Other pieces of tissue can be obtained from fragments remaining attached to the electrode after high frequency cauterization, and others again from the voided urine or the bladder washings. All tissue should be examined. I have repeatedly been able to decide on the malignancy of a case by specimens which the patient has passed.

Response to the high frequency cauterization, i.e., destruction of the growth, will, I think, exclude the neoplasm from the malignant group. Lack of response or lack of complete destruction is characteristic of malignancy, though it also occurs in the presence of what looks like a severe cystitis. Whether these are infiltrating carcinomata with papillary excrescences, and not bona fide cystitides, I do not know. Two cases followed by me eventually proved to be infiltrating carcinomata.

By rectal palpation, one can recognize a malignant bladder tumor with some frequency. Within a recent brief period, we were able to diagnose papillary carcinomata in six successive cases by feeling a distinct mass above the prostate in the site of the papillary growth as seen in the cystoscope.

If no decision can be reached, which is most exceptional, an exploratory operation must be resorted to. This permits of gentle palpation of the indurated (?) base, often without even opening the bladder.

To sum up, a bladder carcinoma is recognized by:

(a) Its characteristic cystoscopic appearance.

(b) Its characteristic microscopic structure.

(c) Its lack of response to the high frequency cauterization.

(d) Its recognition by palpation through the rectum, as a distinct mass in the position occupied by the tumor in the cystoscopic picture.

(e) Exploratory suprapubic palpation.*

Carcinoma of the Prostate: It is well within the truth to say that most prostatic carcinomata are recognized by the pathologist. Of the usual "prostatic hypertrophies" or adenomata, 10 to 25 per cent. show carcinoma microscopically. Clinically these, the vast majority of the carcinomata of the prostate, gave no evidence of malignancy. They were accidental discoveries, and were hidden within benign growths. In addition to this type which is not recognizable clinically, carcinoma of the prostate presents itself as a hard nodule or nodules, or as a hard infiltration of the prostatic tissue, as felt per rectum. This type remains within the capsule for some time, as distinguished from the third type which breaks through the capsule and infiltrates the cellular planes of the pelvis. Irregularities in the contour, hard nodules, stoniness of part or all of the gland, periprostatic thickening, especially toward the seminal vesicles, felt through the anterior rectal wall, suggest malignant disease of the prostate, though prostatic calculus, chronic abscess, chronic prostatitis, may present themselves in a guise very similar to that of carcinoma.

Urethroscopically in carcinoma of the prostate, the contour of the neck of the bladder may present marked irregularities such as are rarely seen with the adenomata of the prostate. Moreover, one may be able to detect a peculiar rigidity of the prostatic urethra in these cases, which is lacking in the elastic adenomata.

Despite all these physical features, an exploratory perineal section and an immediate frozen section of the excised nodule or suspicious area may be necessary to clarify the case, and to justify the radical extirpation that was contemplated.

OPERATIVE THERAPY.

Treatment of Carcinoma of the Bladder:

(a) *Radical.*—

I. Excision with cautery (partial cystectomy) after cauterization of growth through bladder incision (Beer), with or without ureterneostomy. (a) extraperitoneal; (b) intraperitoneal.

II. Excision of whole bladder (complete cystectomy), with (a) bilateral nephrostomy (Watson); (b) ureters in skin, intestines, etc. (Bori button).

(b) *Palliative.**—

I. Nephrostomy, bilateral. } Combined with
II. Ureterostomy, bilateral } *x*-ray and radium
III. Suprapubic cystostomy } treatment.
IV. (No operation, *x*-ray, radium, morphine, etc.)

Treatment of Carcinoma of the Prostate:

(a) *Radical.*—

I. Total excision through perineum, removing prostate and vesicles in one piece (Young).

II. Total excision, abdomino-perineal; removing bladder, vesicles, iliac glands and connective tissue, etc., together with prostate in one piece (Beer). Ureters in skin, etc. (Vide ante AII a,b).

(b) *Palliative.**—

I. Remove as much as possible of the gland, leaving the capsule *in situ.* (Suprapubic approach preferable, as there is no chance of spilling carcinoma cells in the periprostatic tissues.)

II. Suprapubic cystostomy.

III. *X*-ray and radium treatment.

48 WEST SEVENTY-FOURTH STREET.

*One may be forced to avail one's self of an argyrol picture to demonstrate the bladder wall involvement, as suggested by Kelly, when for some reason cystoscopy is impossible. It is scarcely necessary to say that direct inspection is a more valuable method, and that recognizable deformity of the bladder in the *x*-ray cystograph, like cachexia, is usually a late sign.

THE EARLY DIAGNOSIS OF CANCER OF THE BLADDER.

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The problem of dealing with vesical cancer is no different than the problem of dealing with cancer situated elsewhere in the body, namely, that in the light of our present knowledge, some form of surgical intervention is the only curative agent and the probability of cure depends upon early recognition of the disease. Nowhere, however, in the field of surgery have the end-results been so discouraging as in malignancy of the bladder. The reason for this is readily accounted for, but unfortunately difficult to remedy.

The statistics of cures of vesical cancer will not improve to any great extent until the medical profession at large has one fact so strongly impressed upon it that it will never be forgotten. The fact is that *hematuria is frequently the only early symptom of bladder tumor.* If case histories of patients suffering from cancer of the bladder are carefully reviewed, it is of common incident to find that the symptoms of painless hematuria, lasting for but a short time and clearing up, and to have been more or less ignored by the patient or his medical adviser until more acute symptoms indicate disease of the bladder. This primary painless hematuria may have

*Many patients that report at the very first symptom have progressed so far, or are such poor operative risks, that a radical operation may be out of the question.

taken place months or years before unmistakable clinical evidence of malignancy appeared. By means of continual effort, the medical profession at first and later women have been educated to appreciate the dangers which lurk in the apparently innocent breast induration. Similar publicity should be given to the possible danger lurking behind a painless hematuria in a patient in otherwise apparently good health and it should be made so common a piece of knowledge that the patient will himself demand such examination as will lead to at least an exclusion of the possibility of neoplasm.

In 1791, Chopart in his work, "Traitè des Maladies des Voies Urinaires," called attention to this associated hematuria, and certainly it would seem that sufficient time has elapsed for its importance to be more generally appreciated than it really is.

Cancer of the bladder comprises about one-half of the bladder tumors. Of the so-called benign tumors, the most characteristic is the papilloma, and it is also the most amenable to treatment. It has, however, a tendency to become malignant in 65 per cent. to 75 per cent. of cases. (Mandlebaum, Zuckerkandl.)

From their structural origin, bladder tumors are differentiated into, the epithelial and growths which spring from muscle or connective tissue, namely, papilloma, adenoma, carcinoma, and cysts or myxoma, fibroma, myoma, sarcoma, and aberrant types. However much these histological features may interest the pathologist, the important point is that practically all of the bladder tumors are potentially malignant and should be so considered by the clinician. The question of diagnosis is thus resolved into establishing the presence of bladder tumor without delaying its surgical destruction by a prolonged attempt to definitely decide its histological characteristics before curative measures are instituted.

Cystoscopic examination has so broadened diagnostic possibilities and in the hands of trained urologists has become of such diagnostic precision that in most instances where a bladder tumor exists a fairly accurate estimation of benignancy or malignancy can be readily foretold. Great stress has been laid upon the value of information derived from submitting to the pathologist fragments of tumor removed through an operating cystoscope. The futility of this has been so often manifest that I consider it of but small value. Tumors are so frequently of transitional formation that unless the whole tumor be submitted, error is liable to occur. In this connection, Stammler has stated that in the diagnosis of carcinoma, not only the portion of epithelium and stroma must be considered, but also the presence of atypical epithelial nests, which Kümmel thinks are precancerous changes, and which explains recurrences after the removal of so-called benign tumors.

Cystoscopic differentiation between bladder neoplasm and conditions simulating them are well recognized and need but passing mention. The common conditions being diverticulitis, vesical tuberculosis, ulcer, and encysted calculus. A condition which should not be forgotten in cases of diverticulitis is the possibility of tumor formation occurring within the diverticulum. Young, in 1909, reported such a case in which carcinoma had developed within a diverticulum springing from the posterior wall of the bladder. Cystoscopy revealed merely a large organized blood clot within the bladder, and at cystotomy performed for the removal of the blood clot, the carcinomatous diverticulum was discovered and removed.

Phillipowitsch, of Breslau, recommends *x*-ray diagnosis of bladder tumors when urethral stricture obviates cystoscopy. The technic embraces filling the bladder with 5 per cent. collargol solution and removing it by distending the bladder with air. The collargol adhering to the tumor outlines its contour in the radiograph. He claims this will show bladder wall involvement at an early stage. Some such scheme might be of use in a case of carcinoma of a diverticulum, provided that none of the collargol solution remained in the diverticulum after evacuation.

Vesical tuberculosis is, as a rule, secondary to a descending or ascending genito-urinary tuberculosis, so that differentiation from neoplastic ulceration is almost self-evident. Nevertheless, tuberculous tumor masses do occur and may give rise to perplexity. Frank, of Berlin, has recently reported two cases which he removed by the bipolar applications of low-tension high frequency current.

Other than the infectious ulcers (tuberculous and those complicating chronic cystitis), the simple ulcer may give rise to some doubt as to its being of malignant type.

Simple ulcers are usually found in one of two situations, either near the bladder neck or trigone or near the vertex. The first type, well described by Fenwick, are superficial in character and in them an important feature is hemorrhage. Seri has described the simultaneous occurrence of a papilloma and a primary simple ulcer of the bladder. The second type are infiltrating in character and extend to all coats of the bladder, and frequently involve the peritoneum; hemorrhage is less apt to be present, while pain is constant.

Le Fur, in his book, "Des Ulcerations Vesicales," published in 1901, gives Lawson Tait credit for first calling attention to the simple ulcers. Buerger has reported two cases. Recently Hunner has reported eight cases of the perporating type in women. He observes that cystoscopically they may be overlooked, because of the slight mucous membrane changes, and attention may be first called to their presence by noting white scar areas. Beside the white scar area is seen a slightly hyperemic spot or a collection of a few fine blood-vessels.

The simple ulcer of the trigone will, as a rule, respond to topical treatment. Buerger has obtained marked improvement by fulgeration. On the other hand, the perforating ulcer of the vertex necessitates excision of the inflammatory area with the entire subtending bladder wall. These points in treatment therefore become of diagnostic importance.

The last few years have seen a rapid development of the use of electrical cauterization of bladder tumors by means of the cystoscope. It is not within the scope of this paper to dilate upon its curative value, but a word may be appropriate concerning the diagnostic value of the high frequency current in particular when applied to bladder tumors. The comment is that unless tumor destruction is marked and rapid after a few applications of the treatment, it is in all probability malignant, and if the growth is removable by surgical excision, that the patient should be advised to submit to operation, rather than persevere with the less radical measure.

It might seem unnecessary to caution against omitting a bimanual palpation before arriving at a diagnosis in bladder cancer, but I consider it of considerable moment. It is not possible to always decide definitely as to the extent of a vesical growth by cystoscopic findings alone. The smallest portion may be the intravesical projection, and any prognosis as to possible removal made merely by cystoscopic examination may require revision after a bimanual palpation of the growth.

I have purposely not taken up all of the symptoms of advanced carcinoma. They constitute an only too well-known picture. The early diagnosis of bladder cancer must depend upon our ability to make the patient and his medical adviser believe in the importance of heeding the first red sign of danger, the hematuria. Our ideas concerning tumors are undergoing revision. The minute cell structure is considered of less importance than a decade ago. We are more interested in ascertaining the nature of the precancerous forerunners. The understanding and elimination of these will take us far toward the long hoped-for solution.

The comments of Moullin (The Cancer Problem, *Annals of Surgery*, January, 1915) upon cancer in general are especially applicable to bladder tumors and they are therefore well worth quoting:

"It certainly cannot be separated from other tumors. No definite line can be drawn between cancer and sarcoma on the one hand, nor between cancer and certain varieties of undoubtedly innocent tumors on the other. For convenience of classification innocent tumore are collected into one group and malignant ones into another but between the two there is a borderland of which no one can say to which side the growths belong, nor even whether they do not belong at some time to one side and at another to the other. It is certain that many innocent tumors end by becoming malignant. And what are called malignant tumors differ among themselves no less in the degree of their malignancy. There are no hard and fast lines of division anywhere. It is a mistake to try and form a conception of cancer as something apart from all other tumors. It is one of them, and not to be separated from them. The clinical features so often regarded as distinctive, such as the power of dissemination, are in no way peculiar to it. They are merely an exaggeration of powers that can be exercised by many embryonic cells."

BOOK REVIEWS.

Cancer: Its Cause and Treatment. By L. DUNCAN BULKLEY, A.M., M.D., Senior Physician, The New York Skin and Cancer Hospital, etc. Duodecimo; 232 pages. New York: PAUL B. HOEBER, 1915.

In this little book Bulkley pleads for a more consistent and thorough trial of medical treatment of cancer. He attempts to show that not only is malignant disease on the increase, and this especially in the more civilized countries, but that its increase is coincident with greater consumption of certain food-stuffs, notably meat, alcohol, tea and coffee. He believes that the excessive use of these articles so disturbs the metabolic equilibrium of the body that cancer develops more readily.

The cases reported, though not all convincing, nevertheless leave the impression that perhaps more could be accomplished toward ultimate recovery if the medical treatment outlined by the author were used as an adjuvant to surgical procedures.

There are many statements in the book that are made in a rather dogmatic manner and lack substantial scientific proof. For example it is stated on page 94 that "The saliva, and its action, constitutes a very important part in the process of digestion, and consequently of metabolism and the genesis of cancer." The portion of the book dealing with the urinary findings in cancer cases is open to similar criticism. When, as in cancer cases, there are growing in the body abnormal cells, why should the urine not show abnormal findings? To argue that the cancerous cells grow and multiply because of this disturbed metabolism revealed by the urine, seems somewhat farfetched.

However, as we are dealing with a disease, the cause of which we do not know, and the cure of which we are at present unable to bring about, the methods of treatment advocated by the author should be given a fair trial together with surgical intervention.

THE EARLY RECOGNITION OF CANCER OF THE UPPER AIR PASSAGES.

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Nose: The need for the early recognition of cancer within the nose is the more urgent here when we briefly consider the effects of the ravages of the disease in its later stages.

In these later conditions we have not only the disease itself to consider, but its various effects on the economy. The presence of the new growth effectually hinders respiration; it causes most cruel, lancinating pain by pressure within the nose and the sinuses; in the stages of destruction there is a most foul and offensive discharge, and vision is often most seriously impaired, so that the poor victim eagerly awaits the end of his doom.

Very early in the disease it presents itself as a new growth, springing often from one of the turbinates, is easily differentiated from syphilis by our modern method of diagnosis, is readily removed by intranasal methods, and its progress may be carefully watched and treated; respiration being kept free during this time, adding to the patient's comfort and his powers of resistance the while.

It is true that in most instances the neoplasm is deep-seated, having its origin in one of the accessory sinuses, especially the antrum of Highmore, and by the time it appears in the nose it has already advanced too far for much help to be given. But even here with the early removal of a portion of the superior maxilla, life may be prolonged until the dread recurrence appears.

Those of us who have treated nasal conditions have seen how serious becomes the neglect of innocent intranasal growths which may metamorphose into malignancy. Fibromata have become malignant, and even adenomatous growths, polypi, have undergone sarcomatous metamorphosis. I have recorded such a case (*American Medicine,* August 2, 1902, p. 179), and because of its unusual character it is here briefly related:

W. K., male, aged 68, was referred to me because of interference with respiration which had long existed, and for which nothing had been done. His nose was bulging on each side, large polypi almost extruded from his nostrils, his hard palate bulged into his mouth, and the posterior nares were full of the same material. While he was mercifully free from pain, his sufferings from his impeded respiration and mucus and bloody discharge from his nose were very great. I performed tracheotomy under ether, then packed the posterior nares. An incision along the outer side of his nose was carried to the median line, then down through the upper lip, and the nose was held over to one side. I then evulsed a mass of polypi which quite filled a half-pint Mason jar, and found most unusual osseous destruction. There was not a semblance of bony or cartilaginous nasal septum left, and all of the hard palate was gone. Careful suturing resulted in a minimum of scar, and in a short time the tracheotomy tube was withdrawn. The growth was found to be adenomatous tissue undergoing sarcomatous metamorphosis. The patient was comfortable until some two years later, when recurrence set in and death followed.

Such undoubted evidence should serve as a warning, as far as malignancy goes, against the neglect of the harmless nasal polypi.

Mouth: Here the most frequent site of malignant growths is on the tongue. Very often we have an early warning of the possibility of its occurrence in the presence of white patches on the tongue, gums, and cheeks, the leukoplakia buccalis. This leukoplakia may exist for many years, and while not always the precursor of cancer, it occurs so often that we must be on our guard, and view with the gravest alarm any induration of the tongue that may appear. Cancer may appear independently on the gums, cheeks, or floor of the mouth.

Pharynx: The tonsils occasionally undergo malignancy, as also the uvula and soft palate.

Posterior Nares: Cancer appears here in the form of a new growth or of a former innocent one become malignant. Its diagnosis is not always easy, as the only complaint may be some impediment to respiration and perhaps an added nasal twang to the voice.

All methods at our command may be required to localize the growth. The post-nasal mirror will help to reveal its presence and by careful measurements through the nose its extent may be definitely determined. This may be done by introducing a cotton-wrapped applicator through either side of the nose, and pushed well back into or to the naso-pharynx and left *in situ.* A post-nasal examination will show the cotton if protruding into the pharynx and the outlines of the growth reasonably well determined. The naso-pharyngoscope serves well in the determination of the location and often of the extent of the new growth. Finally the finger may be introduced into the naso-pharynx, the density and the presence or absence of attachments digitally determined. Early removal with the galvano-cautery snare has been successfully practiced.

Larynx: The epiglottis may be the seat of a cancerous growth, the early diagnosis of which is of supreme importance, as its complete removal is pos-

sible and the results are gratifying to the sufferer as well as to the surgeon.

I was fortunate in seeing the very inception of a cancer in the epiglottis, and as it was the first case of its kind ever operated upon in the manner described, and as there has been no recurrence in two and a half years, and no discomfort whatever following the removal of the epiglottis, the history is here briefly related (*Transactions American Laryngological Association,* 1913, p. 213):

Male, aged 64, first seen June 9, 1912, had slight pain in swallowing due to edema of the uvula. Had leukoplakia buccalis, no involvement of other parts. Again seen January 19, 1913. Condition the same. February 8, three weeks later, there was a thickened mass with deep ulceration in its center on the inner surface of the epiglottis. A portion removed showed cylindrical cell carcinoma.

February 20, under ether, the patient was suspended by the suspension laryngoscope and the entire epiglottis removed, cutting through healthy tissue only. He made a prompt recovery. Deglutition never interfered with after the first few days. Two and a half years have now elapsed and there has been no recurrence, and the patient is actively engaged in his daily duties.

Cancer of the larynx may occur at any part of the laryngeal interior, its favorite site being on one vocal or false cord. In the early stages it is limited to one-half of the larynx and its early recognition is imperative. From all that has been said on this subject the greatest hope may be held out to patients with a one-sided intralaryngeal cancer, if recognized early enough. Case after case has been recorded as definitely cured by such writers as Sir Felix Semon and Sir St. Clair Thomson in England, and Solis Cohen and Chevalier Jackson in America.

Trachea: Tumors of the trachea are rare fortunately, and we note that it may occur independent of those that may encroach upon the trachea from without.

Bronchi: Occasionally cancer occurs in the bronchi. In the light of our present knowledge the early diagnosis is of no great help to the patient, even though its steady encroachment may be seen.

I was consulted in May, 1911, by a patient aged 34, who complained of a whistling sound in her lung. All other methods failing to locate any cause, the bronchoscope was used. A small growth was seen in the upper bronchus and a piece removed which failed to show evidence of malignancy. An *x*-ray picture was then taken, the lungs being found apparently free.

She disappeared from observation until March, 1915, when she returned complaining of severe hemorrhages. Her whistle had disappeared, she said, after etherization and operation for hemorrhoids.

Physical examination now showed entire absence of vesicular breathing on the right side and a second *x*-ray picture showed complete absence of air in the right lung due to a neoplasm in the upper bronchus. Careful methods of examination and comparison of former and present conditions were of exceeding value in this case as determining the insidious onset of the disease from the small growth to its present proportions.

Résumé: The early recognition of cancer in the upper air passages is of vital importance, as in many instances this recognition not only alleviates suffering, but is followed by complete cure, hence all these cases should be seen by someone who has made a study of diseases of the upper air passages, and who has made himself master of that most difficult and most important part of the treatment of all illnesses—diagnosis.

40 EAST FORTY-FIRST STREET.

THE EARLY DIAGNOSIS OF CANCER OF THE ESOPHAGUS.

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It is due to the combined efforts of experimenters and surgeons in Europe as well as here that we are to-day in possession of a useful method of excising a cancer of the esophagus, in the thoracic as well as the cardiac portion. We are, luckily, no longer groping in the dark. Removal of the proximal end of the resected esophagus from the posterior mediastinum and its transposition, antethoracically, under the skin of the left side of the chest (superior partial esophagoplasy) represents the progress made. We have further learned that the work must be done in stages, either two or three.

Stage 1 consists in performing gastrostomy and making out, by careful and thorough palpation away up in the vault of the diaphragm, the local conditions at and around the cardia, particularly with reference to the mobility of the cardiac tumor, the presence and extent of glandular infiltration, etc.

If the espohageal growth is situated behind or above the aortic arch and there are no infiltrated glands at the cardia, the Beck-Jianu operation* appears at the present moment to be the preferable method, because it combines inferior partial esophagoplasty with gastrostomy. Its mortality is not greater than that of gastrostomy according to one of the older methods. Of six such operations done to date I have had six recoveries.

In case the cancer occupies the lower portion of the thoracic esophagus, particularly if it involves the hiatus esophagus or the cardia itself, the Beck-Jianu gastrostomy cannot be done. Under such

*See author. Annals of Surgery, September, 1913; Journal Am. Med. Assn., January 10, 1914, Vol. LXII, pp. 100-105; Surgery, Gynecology and Obstetrics, February, 1915, pp. 162-170.

conditions, the base of the new tube, formed from the major curvature of the stomach and transposed antethoracically from below upward under the skin of the chest, would enter or be close to the area infected by the carcinoma.

Whether after preliminary gastrostomy the radical extirpation of the tumor can be done in one or two sittings will be decided by the surgeon on the basis of the results of palpation at the time the gastric fistula is established, and by esophagoscopy. If the tumor occupies the cardia proper and esophagoscopy shows the upper limit of the growth to have invaded the esophagus at 38 c.m. or more from the incisor teeth, one can hope to reach the healthy portion of the esophagus above the tumor from below. After cross division of the tube the esophageal transposition can then be accomplished by the extraction method of Kelling-Ach† at the same sitting.

If, on the other hand, a longer portion of the lower end of the esophagus has been invaded by the carcinoma, including the cardia, viz., if the distance of the upper end of the growth as measured at the time of esophagoscopy is 36 cm. or less from the incisor teeth, the operator cannot be sure of being able to pull the healthy portion of the esophagus down sufficiently into the abdomen to enable him to do good work from below. In such an event the operation will become a three-stage one.

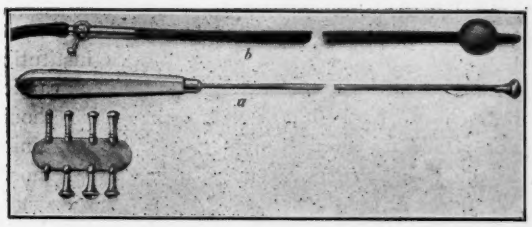
Stage II will consist in thoracotomy; division of the esophagus above the tumor within healthy tissue; safe inversion of the distal end; extraction and transposition of the proximal (oral) stump downward through an esophagotomy wound made at the neck.

Stage III: Removal of the tumor from below after the stomach has been divided transversely and its distal portion closed, the remaining pouch being in communication with the gastric fistula.‡

This is not the place to enter into further operative details. The course of the operation as such has been briefly outlined. This was necessary in order to show that the first of the two factors essential for a successful issue of the resection of a malignant esophageal stricture—no matter in what part of the esophagus it be found—namely, the knowledge of *"how to do the operation,"* is an accomplished fact to-day. Of course, changes and modifications will become necessary as we go on.

The second factor in bringing about a successful issue of esophageal resection consists in the possibility of establishing an early diagnosis of cancer of the esophagus, the subject to be briefly discussed in this article.

Patients who suffer from difficulty in swallowing usually consult the internist first. It is he, then, first of all, who must thoroughly familiarize himself with this question. He, still more than the specialist, must be fully imbued with the importance of the dictum: A patient who complains of trouble in deglutition that has come on gradually, without his having accidentally swallowed any acid or caustic lye, and is steadily increasing, is a surgical case. Just as the general practitioner who keeps abreast with the times considers it to mean "playing with human life" if he treats a case of acute appendicitis expectantly instead of promptly calling in the surgeon, just so must he recognize that delay



(a) Callman's esophageal sound with mushroom tip. (b) Schreiber's esophageal sound for retrograde exploration. The collapsed bulb is filled with water after it has reached the stomach. (c) Interchangeable tips for Callman's sound, representing sizes 15 to 36, French gauge, the increase being 3 millimeters each. (From "Surgery, Gynecology and Obstetrics.")

in establishing the definite diagnosis in the presence of symptoms of obstructed deglutition, is inexcusable and may mean death to the patient, for it has been shown that in at least 80 to 90 per cent. of these cases the trouble is due to carcinoma. Medical treatment of esophageal carcinoma has, of course, a mortality of 100 per cent. Surgical treatment, *i.e.*, operation, it is true and fully recognized, cannot boast of much better results at the present moment. Still, it represents the only chance the patient has, since medical treatment offers none; and certainly the last months of life of a patient afflicted with cancer of the esophagus, or cardia, or lesser curvature of the stomach, are pitiful. To watch these unfortunates die inch by inch is as distressing for the medical attendant as it is terrible for the patient.

On the other hand, operative methods as worked out to-day certainly offer him a chance. Hence, it would seem that a discussion as to the propriety of surgical attack in cases of esophageal carcinoma is out of place at this time. That question has been definitely settled in favor of surgery, I think. The successful cases of operative recovery reported by

†G. Kelling. Centralblatt f. Chirurgie, 1904, No. 20, p. 612; and A. Ach, Beitraege z. Oesophagus Chirurgie, Munich, 1913.

‡It is possible that further evolution of this subject will let us do the entire operation, inclusive of gastrostomy, in one sitting, at least as far as carcinoma of the cardia is concerned. For resection of the thoracic portion of the esophagus the two-stage operation, doing gastrostomy in the first, offers great advantages.

Völker, Kümmel, Sauerbruch, Zaaijer, Ach, and Torek have proven the clinical possibility of recovery. The next decades will see the methods of operation as thoroughly established as those in addominal surgery. Be it remembered that carcinoma of the esophagus, more specifically the squamous-celled epithelioma, is the most benign of all malignant growths occurring in the entire gastro-intestinal tract. It remains locally confined for a comparatively long time, infects the glands at a late period and metastases appear only in the advanced stage of the disease.

May the first point, the foremost one, then be repeated and emphasized once more: Every patient who complains of difficulty in swallowing is to be considered a surgical case. If the medical man, the family physician or specialist, does not have at his disposal the various methods of examination, immediately indicated and necessary for differential and refined diagnosis, he should consider it his duty to refer the patient without delay to such institution where he knows the necessary steps will be carried out. This, of course, does not mean that he should not familiarize himself with everything pertaining to the establishment of the differential diagnosis. But in the present advanced stage of clinical examination, it is absolutely impossible for any one man to command all the methods of examination that have to be resorted to in this class of cases. He therefore must of necessity consult others. The more quickly he does this, the better for the patient.

The Method of Examination: These are enumerated as they seem to me that they ought to be carried out:

1. *Radiography,* particularly stereoscopic radiography with fluoroscopy, deserves first place, for its results are definite, clear and convincing. It may render superfluous other methods of examination. In advanced cases a definite stricture is shown. It is plainly seen by fluoroscopy how the bismuth meal was forced to pass a narrow lumen, if it could pass at all.

For roentgenologic recognition of the early stages of the disease the efforts of A. C. Crump and William H. Stewart, of New York, and of Hessel, Kreuznach, Germany, have paved the way for success. They make the patient swallow or introduce drawn over a bougie a casing which is closed at its lower end and filled with bismuth paste, after it has passed the suspected stricture. The tumor, even in its beginning, will show an irregular line of the esophagus wall in place of the otherwise perfectly straight one, as found, for instance, above a benign stricture.

2. *Sounding:* To make it a rule, as is done almost everywhere to-day, to precede *x*-ray examination by sounding, seems unwise. A thoracic aneurism may have caused the espohageal obstruction by compression from without. Its clinical signs, as made out by palpation and auscultation, may be insignificant, and yet it may be ready to perforate into an internal viscus, one of the many to which it may have become adherent. Just think, if such a perforation should occur at the doctor's office right after sounding! It certainly appears wiser to have sounding *follow* radiography.

Esophageal sounds have been greatly improved in the course of recent years, which is important to early diagnosis. The old olive tip sound should be discarded, although it retains its usefulness in advanced cases. In early cases Callmann's and Schreiber's instruments are preferable, particularly the former (see illustration). Both are used to best advantage by retrograde exploration (Cf. author, *Surg., Gyn. and Obst.,* Dec., 1913).

3. *Esophagoscopy:* This should be done by a specialist. He must be so thoroughly trained as to reassure the surgeon or internist that his examination will not complicate the patient's condition in any respect.

The question whether a small piece of the esophageal wall, when it appears pathologically changed, should be extirpated for microscopical examination *in every instance,* has not been settled as yet. In a beginning tumor the branches of the biting forceps may cause perforation; if used too superficially the specimen may show nothing.

4. *Exploratory Thoracotomy:* This operation takes the same place in the surgery of the thorax as exploratory laparotomy does in abdominal surgery. It has been definitely proven that, under differential pressure, it can be carried out with the same degree of safety as the latter.

Of course, everything must be ready for the surgeon to resect the tumor right then and there should exploration show the presence of a malignant growth.

The Various Alternatives that come into consideration when diagnosing the case of a patient complaining of difficulty in swallowing are the following:

1. *Pressure diverticulum of the esophagus,* as it is not infrequently found at its cervical portion, at a level with the jugulum. The history of the case (duration of dysphagia); radiography (in no disease has this shown more brilliant results); and sounding, will determine its presence.

2. *Cardiospasm:* The same diagnostic means as mentioned under 1, plus esophagoscopy, will determine the cause of the complaint.

3. *Narrowing of the lumen of the esophagus by pressure from without* (swollen glands, aneurism, tumor of the mediastinum, exudate within the pericardium). Clinical examination plus radiography will prove to be deciding factors as regards the differential diagnosis.

4. *Cicatricial stricture:* The history of the case will at once bring out whether such alternative has to be considered. Sounding will establish its presence and esophagoscopy will corroborate it.

5. *Ulcers of the cardia* (tuberculous, syphilitic, peptic). All three are rare. It is self-understood that the necessary clinical examination will be done in every case in order to enable one to exclude or include their significance.

6. *Carcinoma:* As to frequency, carcinoma is at the head of the list of alternatives. As stated above, the cause of slowly increasing difficulty in deglutition after the 20th year of age, in male as well as female patients, *is cancer* in 80 to 90 per cent. of all cases. This fact makes the diagnosis very much easier, for we have the right, on the basis of such knowledge, to consider *every* case of esophageal stricture *suspicious of carcinoma,* after one single question, put to the patient, has ruled out a benign stenosis due to the swallowing of a caustic.

Thus it is seen that no special difficulties exist at the present time to prevent us from making a definite diagnosis in cases of esophageal obstruction even in its early stages.

In view of the great interest to-day shown by so many medical men in this chapter of surgery, it is to be hoped that the day is not far distant when these patients will be given the benefit of an early diagnosis, and therewith a growing chance of a cure.

DELAYS IN CANCER TREATMENT.

The key to the reduction of cancer mortality lies precisely in this: That cancer always begins as a purely local disease involving a strictly limited area; second, that this limited area is accessible in about four-fifths of all cases; and third, and most important, a commencing cancer practically always indicates its presence when it is still in its early, locally limited, and permanently curable stage. In other words, the enemy that we have to fight is not the cancer, but the delay. Nearly 60,000 of our people die every year not because they have cancer, but because they have waited till the cancer became incurable.—*Penn. Med. Society Cancer Commission.*

Bursting open of the abdominal wound happens sufficiently often in cases of gastro-intestinal cancer to make desirable the employment of linen sutures in the fasciae.

THE EARLY DIAGNOSIS OF CANCER OF THE STOMACH: A STUDY OF 921 OPERATIVELY AND PATHOLOGICALLY DEMONSTRATED CASES.

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There is no authentic instance of histologically demonstrated gastric cancer having been cured by non-surgical procedure.

The experience of the surgeon has established the fact that the operative cures of cancer of the stomach have been achieved in those instances of the disease where the neoplasm was so localized as to permit its total excision.

The surgical pathologist familiar with the histologic appearance of recently removed tissue has proved that the greatest number of operatively cured cases of gastric cancer occurs in that group where the diagnosis of malignancy was possible by no other means than by high-power examination of tissue excised from the stomach wall. The early diagnosis of malignancy in these curable cases rested upon the histologic demonstration of intracellular progressive nuclear hypertrophy (functionally) differentiated gland cells, atypical architecture of gland elements, hyperplasia of exuberant gland groups, and invasion of hyperplastic, undifferentiated, epithelial cells into non-epithelial portions of the gastric wall. The cases which derived the maximum benefit from operation were those in which the fewest areas of malignant, epithelial hyperplasia were found, or those where active, gland-cell hyperplasia existed to such an extent as to permit of but a presumptive diagnosis of cancer, histologically.

Findings of the above type occurred with the greatest frequency in specimens of tissue removed from patients in whom the disease seemed, clinically, surgically, and upon gross pathological study, calloused, gastric ulcer.

It is now possible to state that much of the burden of the early diagnosis of gastric cancer rests upon the observations of the skilled surgical pathologist; that such diagnosis is best made from careful study of the histologic variations occurring in recently extirpated tissue; that the malignant departures from the normal are least evident in tissue removed from subjects whose gastric history has been that of recurring, peptic ulcer, and in whom the ailment appeared to be but ulcer of this kind, to both the eye and the hand, at laparotomy. These

ulcers are commonly greater than one cm. in diameter.

While these recently established facts impose a new responsibility upon the pathologist, it should be emphasized strongly that the laboratory worker is dealing with a picked material; the segregation of patients must be made by the clinician, internist, and surgeon. The patient's fate depends in direct ratio upon the completeness of the cooperation existing amongst the three. In their hands, likewise, rests the problem of substantially reducing the mortality of the race from gastric cancer. As an attempt to further this object, I present, briefly, certain facts derived from a clinical study of my records of 921 operatively and pathologically demonstrated instances of cancer of the stomach. These cases were tabulated mainly from my services at the Mayo clinic and at Augustana Hospital.

I.—FACTS DERIVED FROM CLINICAL HISTORIES.

1. *Etiologic:*

(a) *Sex.*—In the series there were 693 males and 228 females, a ratio of rather more than 3:1. This proportion is particularly interesting in view of the observations of other clinicians, viz.: Brinton (1859), males to females as 2:1; Fox (1872), approximately equal ratio of incidence between the sexes; Welch (compilation from many non-related sources), males to females as 5:4; Fenwick (1903), males to females as 6:4, and Friedenwald (1913), 588 males to 412 females (26.6 per cent. only of his cases came to laparotomy). The proportion returned by my series is particularly interesting because it is returned from a controlled material; it is distinctly an American experience and the ratio closely approximates that existing between the sexes when affected by benign, chronic, peptic ulcer.

(b) *Age.*—Between the ages of 40 to 69 occurred 84.9 per cent. of all our cases. Nineteen instances (2.6 per cent.) were recorded below the age of 31. In males nearly 41 per cent. of cases occurred in the sixth decade; in females the disease was most common in the fifth decade (32 per cent.).

(c) *Occupation.*—Approximately one-third of the patients were from farms or rural communities. There appeared to be no other significant occupational pointings.

2. *Clinical History:*

The material groups itself quite sharply under the following symptom-complex heads:

(a) *Gastric cancer in individuals who came to laparotomy for clinically benign gastric ulcer and in whom cancer was diagnosed microscopically from extirpated tissue.*

In this group there were 72 cases (7.8 per cent.). The symptomatology of the group is typified by the following history:

No. 31,598.—Mr. F. B., age 53, farmer.

Family History—Negative.

Personal History—Denies venereal disease; married; two children; wife has had no miscarriages; measles at 12; never used tobacco or alcohol; always worked hard.

Digestive History—For the past fifteen years has had attacks of "stomach trouble" Up to six months ago these came on two or three times a year, being especially aggravating towards the Christmas holidays. The attacks consisted of ache or colics in the right upper abdominal quadrant or towards the rib edges. They would come on three to four hours p.c. or at night and last until he ate something or forced himself to vomit. His appetite was generally good, but he limited his eating at such times. Between the "spells" of dyspepsia he was perfectly well. Six months ago began to have rather constant distress accompanied by acid eructations and some nausea. Appetite became less sharp. One night while unlacing his shoes he felt "queer," and soon afterwards vomited about a pint of red blood. Was in bed a week; then felt fairly well except for soreness in the pit of his stomach. Since the hemorrhage has felt moderately comfortable except for some weakness. Appetite has been a bit capricious. Bowels, which were formerly constipated, have been loose for past two weeks. Never noted blood. Thinks he is about 15 to 20 pounds underweight.

Status Praesens—Moderately well nourished, lanky male; sclera clear; tongue large and coated heavily; teeth poor and dirty; *fetor ex ore.*

Neck and Chest—Negative.

Abdomen—Somewhat full in epigastrium; tenderness with muscle spasm in right upper quadrant and at right rib margin; nothing abnormal palpated. *Rectal examination* negative.

Blood—Hemoglobin 85 per cent. (Tallquist); red blood corpuscles, 5,340,000; white blood corpuscles, 7,000.

Test-Meal—Total acidity 44; free hydrochloric acid 28; combined acids and acid salts 10. No 12-hour retention.

Stool—Trace of blood (Benzidin) on milk diet.

Laparotomy—Calloused ulcer size of a half dollar on lesser curvature in antral region; edges thickened; base clean; no enlargement of perigastric lymph-glands; stomach moderately dilated.

Operation—Mikulicz-Hartman-Billroth No. 2, with posterior gastro-enterostomy.

Pathologic Report—Early carcinoma of glands of edge and base of ulcer. Numerous areas showing epithelial wandering through basement membrane. Extensive round-cell infiltration.

(b) *Group 2—Gastric cancer, which had developed in individuals with long-term, antecedent dyspepsia of the type commonly recognized as peptic ulcer, in whom malignancy subsequently appeared.*

There were 436 (47.3 per cent.) of our cases falling into this group. The clinical picture is represented by the summary which follows:

No. 25,862.—Mr. A. L., age 52, carpenter.

Family History—Negative.

Personal History—Married twice; first wife died of tuberculosis.

Present Trouble—Periodic dyspepsia from 18 to 21 years of age; this consisted of epigastric pain, sour eructations and belching, and occasionally vomiting of sour fluid. At age 22 vomited about a pint of blood; was in bed two weeks; since then has had only rare attacks of the dyspepsia until 17 months ago. He then began to have pain in the epigastrium. This was a gnawing and sore feeling and was worse about two hours after eating. Shortly afterwards he began to vomit. Recently has had night pain, with vomiting about one o'clock in the morning. He frequently vomits up what he had eaten for breakfast and occasionally material eaten the day previously.

Weight Loss—50 pounds in six months.

Physical Examination—Much emaciated; sallow com-

plexion; skin dry; weak and tired looking; tongue coated; thorax negative.

Abdomen—Moderately distended; small umbilical hernia; inguinal glands moderately enlarged. Percussion dullness in flanks—movable. No abdominal tumor palpable. *Rectal* examination—negative. *Liver* and *spleen*, not enlarged.

Laboratory Examinations:

Blood—Hemoglobin 82 per cent.; red blood corpuscles 4,980,000; white blood corpuscles 6,200.

Test-Meal—Total acidity 28; free hydrochloric acid 12; combined acids 8. Altered blood plus. Moderate 12-hour retention. Microscopically—Oppler-Boas bacilli. Yeast plus.

Stool—Altered blood plus (benzidin test). Schmidt bichloride test—Bilirubin.

Laparotomy—Long right rectus incision. About 2,000 cc. of sero-fibrinous peritoneal fluid. Large carcinoma involving greater curvature, with extension into pancreas. Secondaries in liver.

Operation—Exploratory.

Pathologic Report—Gland removed shows adeno-carcinoma.

(c) *Group 3—Gastric cancer in individuals who prior to the onset of a malignant gastric malfunction had experienced perfect gastric health.*

This group furnishes the common "text-book" type of gastric cancer. In our series this class included 294 cases (31.9 per cent.). A specimen of the clinical course of the disease in this group is furnished by the summary following:

Mrs. A. D., age 46, housewife.

Family History—One sister died of "quick consumption."

Personal History—Pleurisy five years ago; lumbago for many years; otherwise well.

Present Illness—"Indigestion" for past two and a half years; this has been characterized by pain in mid-epigastrium constantly present and of gnawing character, pain transmitted to back between shoulders. Pain has been constant and not relieved by diet, medicine or posture.

Nausea—A marked symptom, prostrating and comes on any time of day or night, worse when lying down.

Vomiting—For the past month vomiting after every meal. Vomitus contains food, but no blood. Never bad taste. Vomitus watery, never colored. Relieves some of the distress. Been on liquid diet, but no relief.

Belches gas constantly; never sour; no relief by soda.

Constipation—Marked; never blood.

Flatulence—Marked.

Weight Loss—24 pounds in two years.

Genito-Urinary—No urinary symptoms; menopause one year ago.

Physical Examination—Fairly well developed and nourished; moderate pallor.

Tongue—Slightly coated.

Head, Neck and Chest—Negative.

Abdomen—Diastasis of recti muscles with dilatation of superficial cutaneous veins. Just above navel is a semilunar, freely movable mass 12 cm. long and 5 cm. wide, not tender; can be displaced up and down, but not free from side to side. Tenderness over gall-bladder.

Vaginal—Perinum lacerated.

Laboratory Examinations:

Blood—Hemoglobin 70; red blood corpuscles 4,200,000; white blood corpuscles 7,800.

Test-Meal—Resistance to tube at cardia; no bleeding. Slight 12-hour retention. Total acidity 24; free hydrochloric acid 2; combined acids 18; lactic acid; altered blood (guaiac test). Wolff Junghans' test for soluble albumin (more than 200 units). Glycytryptophan test. Formol index 22 (Sorensen-Schiff method). Microscopic examination—Few bacilli of Boas-Oppler type.

Stool—Altered blood (benzidin test).

Laparotomy—Pylorus and entire less curvature carcinomatous. Stomach thickened, small (leather bottle type).

Operation—Exploratory.

Pathologic Report—Gland shows carcinoma.

(d) *Group 4—Gastric cancer in individuals in whom malignancy followed previous gastric disturbance of no definite clinical type, gastrically.*

Eighty-four patients (9.12 per cent.) made up this group. The digestive upset apparently of benign type which preceded the period of clinical malignancy, varied greatly in its manifestation, but the following summary is a fair representative of the group:

Mr. C. L., age 68, engineer.

Family History—Negative.

Personal History—Usual diseases of childhood; had pneumonia three times—40, 14 and 7 years ago; had typhoid fever 35 years ago; claims to have had three attacks of appendicitis—one 53 years ago, one 56 years ago, and one 6 years ago, in bed each time from 5 days to 2 weeks; had seven attacks of severe la grippe. Denies venereal disease.

Present History—Three months ago was taken with severe cramp in lower abdomen immediately after eating; it lasted fifteen minutes. Twelve hours later again very severe cramp with nausea. No chills, fever, sweats or jaundice. Since then patient has constantly had hard epigastric ache with nausea, water-brash and eructations. Vomits immediately after eating and frequently vomitus contains food eaten 24 to 48 hours previously. Never vomited blood or noted dark stools.

Appetite—Fair.

Bowels—Constipated.

Weight Loss—20 pounds in two months.

Physical Examination—Emaciated; anemic; skin dry and scaly; past maleolar edema; no adenopathy.

Eye Reaction—Normal; eye grounds negative.

Tongue—Coated.

Thorax—Apices rather dull to percussion.

Heart—Slightly enlarged; second aortic tone roughened. Moderate arterio-sclerosis.

Abdomen—Visible peristaltic waves running from left to right in region of navel.

Stomach—By percussion reaches almost to symphysis. No tumor palpable. Resistance in right upper quadrant to deep palpation.

Laboratory Examinations:

Urine—Trace of albumin.

Blood—Hemoglobin 40 per cent.; red blood corpuscles 3,060,000; white blood corpuscles 9,000.

Test-Meal—Marked 12-hour retention. Total acidity 84; free hydrochloric acid 12; combined acid 38; lactic acid plus. Altered blood (benzidin test. Microscopic examination—Great numbers of Oppler-Boas bacilli; colonies of yeasts.

Stool—Altered blood (benzidin test).

Laparotomy—High right rectus incision; Gall-bladder six times normal size; adherent to omentum and contains several large stones. Stomach dilated. Carcinoma involving pylorus and antrum with marked stenosis. Appendix adherent to anterior abdominal wall. Glands along lesser curvature carcinomatous.

Operation—Posterior gastro-enterostomy; separation of adhesions; appendicectomy; cholecystostomy.

Pathologic Record—Gland, carcinoma.

(e) *Group 5—Gastric cancer in individuals who presented few clinical evidences of a malignant disease primary in the stomach.*

There were nineteen such cases (2.1 per cent.) in the series. While these patients, clinically, were apparently affected by some grave disorder, the symptoms did not pain especially to gastric involvement. Exploratory laparotomy was necessary to make certain the location and the type of ailment. The following history summary is representative of the group:

Dr. C. H. B., age 59, physician.
Family History—Negative.
Personal History—Usual diseases of childhood; rheumatism age 12; amputation lower right leg age 14 (accident); maxillary sinus infection for the past 15 years; typhoid fever age 25. Denies venereal.
Present Illness—Perfectly well in every way until five months ago; after a period of overwork noted distention of bowels with gas. This was relieved by lying down. The distention occurred only on an empty stomach. During the past month has had several attacks of unexplained nausea accompanied by epigastric distention.
Appetite—Fair.
Bowels—Normal until one week ago, when patient began to have diarrhea; a slight excess of mucous noted in the stools, but no blood.
Weight Loss—Thinks he may have lost about 10 pounds during past year.
Habits—Careful eater; smokes occasionally; drinks two or three ounces of whisky every two or three days.
Physical Examination—Fairly well nourished; somewhat pale; apparently somewhat underweight. Skin dry; somewhat pale; tongue coated.
Thorax—Negative.
Abdomen—Moderately distended, particularly over the colon. In the epigastrium is a sensation of deep resistance without actual pain or tenderness. Auscultation, gurgling sounds over infra-navel region.
Rectal Examination—Moderately enlarged prostate.
Test-Meal—Stomach tube meets resistance just below the cardia, and upon gastric lavage numerous blood clots were in the wash water; gastric extract cream colored, somewhat sour odor and showed food poorly chymified. There was no gastric retention. Total acidity 18; free hydrochloride 0; lactic acid trace; altered blood plus. Wolff-Junghans test 200 units plus.
Microscopic examination of unfiltered gastric extract revealed Oppler-Boas bacilli, great numbers of streptococci, many short, fat rods and numerous arythrocytes.
Stool—Diarrheic type containing much undigested food of all kinds. Benzidin test for blood trace.
Fluoroscopic Examination—Esophagus patent; no obstruction at the cardia; stomach in good position, fair size; gaping pylorus with prompt visualization of the duodenum. In the pars-media there is a large filling defect involving both curvatures and apparently extending posteriorly into the pancreas, causing the stomach to be fixed in its middle third.
Blood Examination——Hemoglobin 70 per cent.; reds 4,300,000; white cells 8,900.
Laparotomy Findings—Infiltrating tumor the size of new-born infant's head on the posterior wall of the stomach in the pars-media involving the pancreas by direct extension; moderate enlargement of perigastric lymph glands.
Operation—Exploratory.
Pathologic Report—Small gland removed shows carcinoma.

(f) *Group 6—Gastric cancer secondary to extragastric malignancy.*

There were sixteen cases (1.7 per cent.) of this type in our series. Secondary gastric growths most commonly followed malignant disease of the breast, female genitalia, gall-tract, or pancreas. In such instances, it was not infrequently impossible to localize the primary process before laparotomy. The following summary is representative:

Mrs. S. E. H., age 56, housewife.
Family History—Negative.
Personal History—Typhoid fever age 30. Operated upon five years ago for gall-stones. Two years ago had carcinoma of the uterus removed (radical operation).
Present Complaint—Perfectly well gastrically to one year ago, then noted dull pain below the left costal arch; this came on usually when the stomach was filled and lasted several hours. The pain was accompanied by burning sensations in the throat and mouth, water-brash and disagreeable taste. Never nauseated or vomited. Pain and distress were relieved by limitation of diet and by the taking of milk of magnesia.
Appetite—Has been fair.
Bowels—Regular.
Weight Loss—15 pounds in past six months.
Physical Examination—Tired looking, somewhat anemic female, moderately well nourished.
Teeth—Poor; marked pyorrhea.
Neck and Thorax—Negative.
Abdomen—Low median well healed scar. In the right epigastrium on deep palpation is a small ridge which can be moved slightly beneath the fingers.
Rectal Examination—Nodules (?) in cul-de-sac.
Urine—Negative.
Stool—Negative.
Fluoroscopic Examination—Moderate dilatation of the stomach; at the pylorus there is a filling defect involving the pylorus and the greater curvature of the antrum. The duodenum is visualized irregularly. There is no six-hour retention of bismuth.
Test-Meal—Slight 12-hour food retention; free hydrochloride 20; no blood.
Laparotomy Findings—A hard nodular infiltrating mass involving the pylorus and antrum.
Operation—Pylorectomy, posterior gastro-enterostomy.
Pathologic Report—Carcinoma.

3. *Hemorrhage:*

Macroscopic.—Of the whole number of cases making up the series, gross evidences of bleeding were recorded in 170 cases (18.5 per cent.). Of the whole number bleeding 17.4 per cent. had had hematemesis or melena at least two years before coming under observation. In the large majority of instances where such early bleeding had been noted, the precarcinomatous history conformed to that which we interpret clinically as chronic peptic ulcer.

Chemical Test for Blood.—In the gastric extracts such were positive in rather more than 78 per cent. of instances by the guaiac or benzidin method. The stools examined upon a meat-free diet in 380 consecutive cases gave positive chemical blood tests in rather more than 82 per cent. of cases.

The interpretation of chemical tests for blood in stools must be carefully guarded. In those instances where there is a slowly progressing malignant ulcer, benzidin or guaiac tests are apt to be only intermittently positive. Given an ulcer history the persistent demonstration of altered blood in the stools is a fair indication that malignancy is highly probable. In this way it is readily seen that positive occult blood tests are of greater service in informing us with respect to the character of a peptic ulcer than in merely demonstrating that gastric ulcer exists. It would thus appear that chemical tests for blood in the properly prepared stool furnish a valuable and early diagnostic sign in gastric cancer. This is especially significant when it is remembered that ulcera carcinomatosa are the most amenable to surgical treatment. In cases where gastric cancer was well advanced, chemical tests for blood were positive in nearly 83 per cent. of instances. Of course, when this finding was noted, other evidences of gastric cancer were usually not lacking.

4. *Vomiting:*

This is generally due to a persistent mechanical fault in the emptying power of the stomach. It may have been preceded by a long period of nausea. The mechanical hindrance to the passage of food from the stomach most commonly occurs earliest as a consequence of varying grades of stenosis associated with chronic peptic ulcer. In this type of case, vomiting is intermittent or persistent in nearly three out of four instances. This clinical hint, particularly if it is associated with history of ulcer dyspepsia in a patient at the cancer age, should point to prompt surgical procedures. Such radical measure often leads to the actual demonstration of early gastric cancer and permits of its complete extirpation. When cancer has become far advanced vomiting is a prominent symptom in nearly 80 per cent. of cases. The vomitus in such instances is apt to be tan brown in color, cheesy or rancid in odor, to contain chunks of poorly chymified food, and to be particularly copious.

II.—FACTS DETERMINED BY PHYSICAL EXAMINATION.

(a) *The Abdominal Tumor.*—In instances of gastric cancer where the diagnosis rests upon microscopic examination of extirpated tissue, but rarely it is possible to demonstrate epigastric tumor. The few cases where ridges or suspicious indurations are made out occur in conjunction with chronic, perforating ulcers of malignant type, associated with exuberant scar tissue proliferation. There were 312 individuals (33.7 per cent.) in our series of gastric cancers where no abdominal tumor was present before laparotomy. In this class occurred the highest percentage of operative cures. There were 609 cases (66.2 per cent.) where abdominal tumor or ridge was definitely made out at the first examination or after inflation of the stomach with air. In rather less than one-third of such instances were the surgical advantages of localization of the disease present at laparotomy. From these facts it is quite evident that diagnosis early enough to be of service to the patient must usually be made before it is possible for him or his physician to recognize an abdominal mass. In about 9 per cent. of well advanced gastric cancers abdominal tumor cannot be made out. These are usually growths located at the cardia, high on the lesser curvature, at the fundus or on the posterior wall. Where the neoplasm is of the diffusely infiltrating type (colloid or schirrhus), the abdominal wall tense or the peritoneal sac distended with free fluid, even extensive gastric cancers with metastases may not be associated with palpable abdominal tumor.

The location of the abdominal tumor.—In our series, the palpable nodule or mass was located in the epigastrium in 85.7 per cent. In 86 instances (13 per cent.) the growth was demonstrated in the region of the navel or at about its level. Only eight times (1.4 per cent.) was the tumor observed below the level of the navel.

Relation of the position of the palpable abdominal tumor, with regard to the part of the stomach involved.—Our study shows that 66.7 per cent. of the neoplasms involved the pyloric region, the antrum, and the pyloric half of the lesser curvature. Approximately eight out of ten such growths were palpated before laparotomy. In 12 per cent. the greater curvature had been invaded. In such event nine out of ten of the tumors were palpable. The posterior wall was the seat of the disease in 9.3 per cent. In this group, the tumor could be felt externally in but five out of ten instances. The anterior wall was involved in 2.3 per cent. These tumors were palpable in nine out of ten instances. In 3.5 per cent. of our cases the neoplasm was at or near the cardia; but three out of ten such tumors were palpable. The greater curvature was involved in 2.3 per cent., and of these growths six out of ten were palpable. In this series, none of the tumors involving the fundus was palpable, but in such cases dullness on percussion was generally definite in Traube's semilunar space. Some part of the multiple tumors forming 2.9 per cent. of the group were palpable in nine out of ten instances.

The size of the abdominal tumor that is palpable varies greatly. Ulcera carcinomatosa may be felt only as narrow, finger-like ridges or as small nodules, even after the stomach has been inflated with air. Beginning, primary gastric cancers range in size on palpation from that of a common marble to that of a lemon. When the tumor has progressed for some time it may be as large as a child's head, a medium-sized squash, or a discus. The tumor may fill the entire epigastrium and extend well into the left flank. It may be so large as to simulate a leukemic spleen. If invasion of the liver, pancreas, or adjacent hollow viscera has taken place, a huge, irregular, or plaque-like mass may occupy the entire upper abdomen. Rarely does the growth extend below the navel, but if the omentum is involved, the tumor may seem to be so extensive as to cast doubt upon its being primarily of gastric origin.

(b) *Abdominal Tenderness.*—This is apt to be most marked in ulcera carcinomatosa. The area of tenderness is most commonly situated in the epigastrium between the right nipple line and the left parasternal line. Definitely circumscribed spots of maximum tenderness are not infrequently deter-

mined, but most commonly there is present diffuse epigastric regions of distress upon palpation. Where there has been early invasion of the peritoneal coats the palpating fingers often have conveyed to them a peculiar sensation of deep resistance. Over such an area there is not rarely dullness upon percussion.

In well advanced cancer, the abdomen or the tumor proper is not commonly very tender upon palpation, unless perforation or extensive ulceration has taken place. Very often a tumor may be moved about freely without causing the patient much discomfort.

(c) *Weight Loss.*—In ulcera carcinomatosa the weight loss may be unnoticed for months. There may be slight losses followed by definite gain for a long period. Ultimately, however, the drop is steadily maintained and its rate accelerated. The average weight loss in the stage definitely ulcus carcinomatosum in this series was nearly 17 pounds. When frank malignancy had become established the average loss was more than 26 pounds. In the type of case which from its inception is definitely malignant, steady weight loss is the rule. There are few instances in this group where treatment other than surgical is accompanied by gain in weight maintained for any appreciable length of time. Persistent weight loss in an individual over 40 years of age who has been a chronic dyspeptic, or who has recently become affected with persistent gastric upset, demands that gastric malignancy be excluded before any other diagnosis can be seriously considered. The average weight loss in our cases of primary cancer was 31 pounds.

(d) *Cachexia* is a late manifestation in gastric cancer. When pallor, definite anemia, physical weakness, mental lassitude, and loose, dry skin, with or without edema about the malleoli, are noted, the cases are hopelessly involved by the neoplasm in more than three out of four instances. Cachexia is rarely a sign of definite note in early gastric cancer, whether such growth follows a previous, long-term dyspepsia or has arisen abruptly from what we are apt to consider a healthy gastric mucosa. The diagnosis which requires evidences of systemic cancer poisoning for its substantiation is only of interest so far as personal satisfaction is concerned. Early fatal termination of the case can usually be safely prognosed. In these instances, palliative operations only are possible.

III.—FACTS DETERMINED BY LABORATORY METHODS.

(a) *Test-meal Analyses.*—Persistent interference with the free emptying power of the stomach is a sign of great worth in the early diagnosis of gastric malignancy. It indicates at once a mechanical fault that cannot be permanently treated by non-surgical procedures. If the individual in whom such interference to free gastric emptying has been affected with a chronic dyspepsia, and that dyspepsia has been clinically of the ulcer type, one must consider that he is dealing with a condition which is potentially cancer, if not actually so. In this very group of cases, surgical exploration reveals the greatest percentage of early gastric cancers, and from this class are returned the greatest number of permanent cures of the disease.

Proof of gastric emptying power should always be determined by the administration of a mixed meal consisting of a liberal allowance of ordinary food. Meals of the pap variety are of practically no value in determining gastric emptying power. The persistent demonstration of test-food remnants in a stomach after from eight to twelve hours means a mechanical fault.

In our gastric cancer series, gastric emptying power was interfered with in nearly 71 per cent. of instances. Food stagnation was demonstrated in approximately 10 per cent. more frequently in instances of the disease that had been shown to be malignancy following long-term, clinically benign dyspepsia.

Gastric acidity estimations are of considerable worth if properly interpreted. . The quantitative fluctuations in free hydrochloric acid are of greater value prognostically than diagnostically. A carelessly compiled literature has conveyed the impression that gastric cancer and absent or low free hydrochloric acidity go hand in hand. As a consequence not a small portion of the mortality from cancer of the stomach can be traced to the physician's persistently treating the dyspeptic medically until free hydrochloric acid has entirely disappeared—and with it the patient's chance for cure.

In but 52.4 per cent. of our cases of gastric cancer was free hydrochloric acid absent from the removed test-meals. Where free acid was present, it ranged from a trace to as high as 160. Approximately one out of five cases had free hydrochloric acidity between 20 and 50.

In inoperable, ulcerated, primary gastric cancer, the average free H.Cl. was 2.4. The average total acidity was 28.

In inoperable gastric cancer without gross evidences of ulceration, the average free H.Cl. was 6.4. The average total acidity was 28.

In ulcera carcinomatosa (commonly operable, with a high percentage of permanent cures), the average free H.Cl. was 31. The average total acid-

ity was 48. These figures closely resemble those returned from the analyses of gastric extracts from instances of chronic peptic ulcer, even when interpreted in the light of clinical history. However, in a given case, the progressive lowering of the free H. Cl. and a corresponding increase in the combined H.Cl., associated with permanent interference with the gastric emptying power and the persistence of altered blood in the properly prepared stool, necessitates the advice that laparotomy should be performed on the suspicion that malignancy is present.

Lactic acid clinically means gastric stagnation in the presence of diminished free H.Cl. It is rarely demonstrated when free H.Cl. is higher than 10. It was demonstrated in rather more than 52 per cent. of the cases in our series. In nine out of ten instances where lactic acid was present in the gastric extracts, irremovable malignancy (stomach, perigastric lymph glands, adjacent viscera) was found at laparotomy. It is thus seen that the proof that lactic acid exists in test-meal specimens has an interesting prognostic value. It usually means that hopeless cancer is present. In about 48 per cent. of gastric cancers, however, lactic acid cannot be demonstrated in the test-meal. In this very group we have those instances of the disease most amenable to surgical treatment.

The Significance of the Demonstration of Specific Ferments in Gastric Cancer:

The formol index.—In the early diagnosis of neoplasms of the stomach, it would seem that the estimation of the ereptic power of gastric juice toward peptone solutions is of considerable value in supplementing the clinical history and other examinations. In a recent study, using the formaldehyde titration method suggested by Sorenson and Schiff, we were able to demonstrate rather characteristic findings in gastric cancer, particularly in ulcus carcinomatosum. The average formol index of 87 cases of proved gastric cancer was 22.3. The average index in 22 instances of ulcus carcinomatosum was 19.18; the average index in 99 cases of duodenal ulcer was 12.4; of 57 cases of benign gastric ulcer, 11.6; of 32 cases of benign achylia, 14.1; of 16 cases of pernicious anemia, 14.5, and of five cases of cancer of the liver, 4.25.

The edestin test (Fuld-Levison).—Our experience covers 108 cases. The work appears to indicate that early cases of gastric cancer, where the free hydrochloric acidity is low, are associated with high peptolysis and low proteolysis. In benign gastric ulcers low readings for both peptolysis and proteolysis are obtained.

The glycyltryptophan test.—This reaction proved positive in approximately 40 per cent. of 186 operatively demonstrated instances of gastric cancer. The reaction has but a chemically interesting value, apparently, inasmuch as, in our cases, where positive tests were obtained, diagnosis was generally quite possible from the clinical examinations.

The Wolff-Junghans test for soluble albumin.—From the examination of 230 instances of pathologically demonstrated gastric cancer (well established types of the disease and ulcera carcinomatosa) we obtained positive manifestations of the test in 80.1 per cent. There were 15 instances of ulcera carcinomatosa examined consecutively in which positive Wolff-Junghans' reaction was obtained in more than 90 per cent. Positive manifestations of the test were rarely obtained in cases of non-malignant achylia (extra-gastric malignancy, pernicious anemia, and the like). It would appear that this test, when taken as a part of evidence making for a complete clinical diagnosis, has suggestive pointings. The high percentage of positive reactions obtained in instances of ulcera carcinomatosa and early gastric malignancy of a fulminant type is not without clinical significance. It would appear to be an indication of laparotomy at a stage when the maximum benefit from localization of the disease would be obtained.

The Microscopic Examination of Gastric Contents.—There is no characteristic microscopic picture of early gastric cancer other than that associated with gastric stagnation consequent to the development of stenosing calloused peptic ulcer. In such event, the microscopic findings are those indicating simple gastric fermentation as a result of active proliferation of yeasts and sarcinae. When gastric cancer has become well established and with it varying grades of gastric retention are found, there is no microscopic picture more characteristic. Using the colored agar method which we suggested some four years ago, we were able to demonstrate organisms of the Boas-Oppler type in 94.1 per cent. of 172 consecutive instances of the disease. Yeasts were concomitant in nearly 31 per cent. Sarcinae were associated in rather more than 10 per cent. Threads of streptococci were found in nearly 7 per cent., and were especially common in excess in instances of non-stenosing malignancy. It is interesting to observe that when organisms of the Boas-Oppler type are present in gastric extracts, free hydrochloric acidity is below 10 in more than 90 per cent. of instances, and that an abdominal mass can be palpated in more than three out of four cases. The finding of an abundance of Boas-Oppler bacilli has a certain prognostic value, inasmuch as our study shows that in eight out of ten

instances where such organisms were present, palliative operations only were possible. The curable cases of gastric cancer are rarely associated with the demonstration of Boas-Oppler bacilli in gastric extracts. It is extremely uncommon to find bacilli of the Boas-Oppler type in instances of non-malignant gastric disease.

Epithelial cells showing atypical mitoses, so called "cancer-cells," were demonstrated in rather more than 1 per cent. of our cases. Occasionally a growth situated at or near the cardia permits of the prompt recognition of such abnormal cells, and an early cancerous process may be diagnosed thereby. As a rule, however, the findings of "cancer-cells" in the gastric extracts indicates an extensively sloughing process or one so located anatomically (cardia, high lesser curvature, fundus) that excision is impossible, even though the disease be not far advanced.

(b) *Serologic Analyses:*

Proper standardization of the Abderhalden technic may result in valuable information being obtained in early gastric cancer, particularly in instances where the malignant transition of a gastric ulcer is suspected. Unfortunately, when there exists the clinical suspicion that gastric cancer exists, it is not uncommon to find that the process has become well established and surgery can offer little.

IV.—FACTS RETURNED BY ROENTGEN EXAMINATION.

When gastric cancer has become well established roentgen examination gives useful information in more than 90 per cent. of instances. These cases show deformity in the stomach outline, alterations in gastric peristalsis and emptying power, variations in stomach size, abnormal position of the viscus or fixation to adjacent organs. In nearly 10 per cent. of our series of gastric cancer, the roentgen examination proved the diagnosis where previously but a suspicion that malignancy existed had been entertained. These cases were usually instances where the tumor was physically inaccessible, *e.g.*, at the cardia, fundus, posterior wall, or high on the lesser curvature. In the differentiation between gastric and extra-gastric malignant disease the fluoroscopic examination is of particular service.

The very early cases of gastric cancer or ulcus carcinomatosum rarely exhibit characteristic pictures by either *x*-ray plate or upon fluoroscopic examination. This is very fortunate because this is just the type of disease where the most can be done for the patient surgically. When the roentgen examination reveals definite evidences of gastric cancer other manifestations of the ailment are generally not lacking. In a recent series of 121 instances of the disease in which roentgen findings were positive or strongly probable for malignancy in nearly 92 per cent. of instances organisms of the Boas-Oppler type were present in 93.8 per cent.; abdominal tumor or ridge was palpable in 73 per cent.; absent or very low free H.Cl. estimated in 88 per cent.; formol index above 18 in 91 per cent.; Wolff-Junghans' tests positive in 82 per cent.; gastric stagnation as shown by the physiological motor meal determined in 76 per cent., and clinical history that of primary malignancy or malignancy following dyspepsia of the ulcer type in nearly 96 per cent.

The surgical pathologist has taught us that chronic, calloused or crater ulcers of the stomach that are more than 1cm. in diameter are microscopically malignant in nearly three out of four instances. They are actually or potentially cancer. The roentgen determination of a gastric ulcer of this type, particularly if such be located in the pyloric half of the stomach, should lead to a presumptive diagnosis of malignant ulcer and suggest abdominal exploration. It would appear that an observation of this kind would, in a large majority of instances, comprise the earliest possible roentgen diagnosis of gastric cancer.

V.—GASTROSCOPY.

In the hands of an expert, the Sussmann gastroscope permits of definite localization of gastric malignancy, but it is to be questioned whether such special procedure is of any great worth in the detection of early malignant changes, primarily in the stomach wall or arising in the edge of a calloused peptic ulcer.

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CANCER MORTALITY.

It is a fact that cancer kills about 75,000 people in the United States every year. Any disease which causes such a high annual toll should command the careful attention of the government, the medical profession, and the people. The need for this careful attention is all the more imperative if both the morbidity and mortality can be very largely reduced by cooperation on the part of these three forces, *i.e.*, the government, its people, and their physicians.

The reduction that has been caused in tuberculosis is now a matter of history. There can be no doubt that similar well-directed and persistent activity would cause a similar effect in cancer.—*Pennsylvania Med. Society Cancer Commission.*

THE EARLY DIAGNOSIS OF CANCER OF THE STOMACH.*

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Introduction: In the United States, during the year 1913, seventy-five thousand people died of cancer (Hoffman[1]). Thirty-five per cent. of these cases, or about 26,000, were cancers of the stomach. The mortality of this disease is no less appalling now than then. Mayo[2] says that "cancer of the stomach is the most frequent form of cancer in the human body."

The statistics collected by Rodman[3] show that from 60 per cent. to 72 per cent. of gastric cancer developed upon an ulcer base. Any consideration of cancer of the stomach must necessarily include a careful study of ulcers of this organ.

With thousands of people dying yearly from this dread disease it is eminently proper that we should again and again revert to this topic in our medical meetings in order that not only the medical profession but also the people should give more attention to the beginning of gastric symptoms so that by early surgical intervention many may be saved from the ultimate cancer. Improvement in statistics can come only by treating the ulcer itself before or soon after it has begun to develop malignancy. In other words, a clinically recognized cancer of the stomach is practically beyond operative cure and it is only by the prophylactic, surgical treatment of the ulcer that the great mortality of cancer of the stomach can be diminished.

Thousands of people with well-defined symptoms of gastric or duodenal ulcers are inviting hemorrhage, perforation or cancer itself by continuing to dose themselves for their indigestion with all sorts of proprietary concoctions. Hundreds of doctors are treating ulcer patients for indigestion, neurasthenia, biliousness, etc., because they do not take the time and means to determine the real cause of the patients' illness.

Mayo says that the "mistakes in diagnosis are more often the result of a lack of examination than a lack of knowledge." I fully realize the difficulties in the way of making a correct diagnosis in many cases, even with the aid of the laboratory and *x*-ray plates, yet I contend that with or without laboratory confirmation of our suspicions the only safe course to follow is to perform an exploratory operation and not wait until a hemorrhage, perforation or a palpable mass forces surgical intervention.

Inasmuch as cancer of the stomach is so closely related to ulcer of this viscus in its origin, symptoms and treatment, it is necessary for us to carefully study this antecedent pathologic condition as well as the graver lesion itself.

Etiology: Primary cancer of the stomach arising independently of a preceding ulceration must be very rare. Wilson and McCarty of the Mayo clinic assign to ulcer a causative factor in 71 per cent. Moynihan ascribes over 72 per cent. of gastric cancers to this cause. Hartmann[6], however, claims that ulcer acts as a cause in less than 10 per cent. of cases. Aschoff[4] goes still further and says that the callous, gastric ulcers, which the microscope reveals as cancer, are explained by the assumption that the cancer is the primary lesion and that the ulcer merely develops in the malignant growth.

Notwithstanding these differences of opinion, I am convinced that the evidence furnished by American and English surgeons is too overwhelming to allow of any other conclusion than that at least 70 per cent. of gastric cancers arise from a preceding chronic ulcer.

The general belief that an embolus or a thrombosis in an artery is the usual cause of a gastric or duodenal ulcer will have to be modified. While such a cause may possibly act to produce an acute ulcer, Aschoff claims that certain mechanical factors, as the pushing in of the stomach wall by surrounding viscera or structures cause an elevation in the stomach and these elevated spots are subject to greater friction and traumatism than others and favor the erosion of the mucous membrane and its ulceration. On the other hand, Rosenow[5] has caused ulcers of the stomach and duodenum experimentally by the intravenous injection of certain streptococci into rabbits, dogs, and a monkey. He claims that gastric and duodenal ulcers are not caused by swallowing bacteria, but by their entrance into the circulation often from infected tonsils and teeth. Such experimental lesions were found most frequently in the pyloric end of the stomach. He also found that inflammation of the gall-bladder with the formation of gall-stones and appendicitis were other results of bacterial injection. It is reasonable to conclude that, besides the usual causes which have heretofore been accepted as producing gastric and duodenal ulcers, traumatism and hematogenous infection are also important factors.

Location: Although there are variations in the

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statistics of different observers, it is reasonably certain that at least 75 per cent. of gastric ulcers and cancers are in the pyloric region of the stomach. Rodman says that 80 per cent. of gastric ulcers are in the pyloric one-fifth of the stomach and only 20 per cent. in the rest of the organ. To us this is very important because, unless these lesions are within the grasp of the grinding end of the stomach, no symptoms may arise to call attention to the condition until a hemorrhage, perforation in ulcer or a palpable mass in cancer suddenly appears.

Duodenal ulcers are three times more prevalent than gastric. But fortunately for the race, they are almost never followed by cancerous degeneration. Such ulcers are usually found in the first two inches of the bowel, more often on its anterio-superior wall close to the pylorus.

In order to locate the pylorus, during a laparotomy, so that the position of an ulcer may be determined, Mayo has described the presence of a pyloric vein which we have often identified; but Hartmann claims that this landmark is unreliable. He also quotes Latarjet, Houdard and Mocquot and concludes "that nothing in the aspect of the veins of this region can enable one to recognize the seat of the pylorus."

Age and Sex: There are three times as many males as females afflicted with these lesions. The age incident is about the same in both sexes. Ulcers appear in the earlier years, cancers in the later. Most cases will be found between the ages of 20 and 50, with ulcers predominating in the first half and cancers growing more numerous in the last half of the period.

Symptoms: Inasmuch as the usual gastric cancer develops upon an ulcer base and has no independent pathognomonic symptoms in its early stage our only chance of lessening the heavy mortality of cancer of the stomach lies in an early diagnosis and treatment of the primary lesion.

If the case is one of primary cancer of the stomach, arising independently of ulcer, the probability of its early detection is very slight unless the growth lies within the pyloric sphere and excites pyloric spasm.

While spasm of the pylorus is a constant attendant of both gastric and duodenal ulcers and growths, benign as well as malignant, in the smaller end of the stomach, it is also excited by other and even distant lesions, as gall-stones, chronic appendicitis, etc., and one needs to keep in mind such possibilities.

Many writers and most text-books give us clear-cut symptoms differentiating ulcers in the stomach and in the duodenum, and also the symptoms to be found in cancer of the stomach, but we must remember that there are many variations and each case must be studied by itself.

Mayo[7] says that cancer of the stomach *does not produce* symptoms of cancer during the *curable* period. And in reference to the clinical diagnosis between gastric and duodenal ulcers, Hartmann says that "the symptoms given as characteristic of duodenal ulcer by German and American authors are in our opinion simply signs of pyloric spasm." Again, "pyloric spasm whether due to gastric or duodenal ulcer give late pain—three to four hours—after eating, often at night, with painful sensation of hunger relieved by food." Further, he says that in 200 cases of perforating duodenal ulcer, seventeen gave no previous sign of such a condition. In fifty-five the symptoms were very vague and none characteristic of duodenal ulcer.

I have been called to operate upon perforating ulcer when either no history of a previous ulcer state could be obtained, or such history only upon careful inquiry after the operation. In only a few cases is there any history of a preceding stage of gastric disturbance. In the chronic ulcer, however, there is usually a long and fairly typical combination of symptoms.

The symptoms of ulcer, whether gastric or duodenal, are practically the same, but vary as to onset, duration and cessation.

Pain is probably the most significant symptom. Some sort of pain is present in probably over 90 per cent. of cases, but it is atypical in at least half of these. Usually it is felt in the pit of the stomach and radiates up behind the sternum, back to the left of the spine or to the base of the chest on one or both sides. Pain is not caused by food, with one exception and that is ulcer of the lesser curvature of the stomach, but by the irritating acid gastric juice coming in contact with a raw surface.

In gastric ulcer, pain will then appear during the height of digestion in that organ, usually from one to three or even more hours after eating. It increases in intensity as the gastric juice becomes more acid, is attended with nausea, eructations of gas and sour fluid until relief is obtained by neutralizing the acid juice by more food, by alkalies or by ejecting the stomach contents by vomiting.

In duodenal ulcer, pain is usually felt from three to four hours after eating, when the acid chyme is being injected into the duodenum and comes into contact with the ulcerated area. This pain lasts while the stomach is emptying itself of its acid contents, about two hours. The pain is relieved by the same measures that give relief to the pain in the first instance. During the night, the patient is often

awakened by so-called "hunger pain" in duodenal ulcer. This is caused by the acid secretions forming in the empty stomach and irritating the ulcer. Relief is obtained by taking food or alkalies. It is supposed that "hunger pain" felt at night is particularly a symptom of duodenal ulcer, but Hartmann claims it is present in both gastric and duodenal ulcer and is merely a symptom of pyloric spasm.

Nausea, persisting until vomiting takes place, is a more constant symptom of gastric than of duodenal ulcer.

Hematemesis is, of course, a more constant attendant of gastric and *melena* of duodenal ulcer, but both may be present with either.

Persistent *occult blood* from the stomach or in the feces is a very sure sign of ulcer. It is really more valuable than gross bleeding which may come as a result of cardiac insufficiency or cirrhosis of the liver.

These symptoms of pain after eating, distress, gas, acid eructations and regurgitations after meals, relieved by taking food or alkalies are the few upon which one constructs a tentative diagnosis. They are all essentially chronic, lasting for many years. They are also periodic, coming on apparently suddenly, lasting for weeks or longer and as suddenly leaving. During the interval the individual is apparently well. As time goes on, these attacks grow more frequent and last longer, so that the well interval gradually diminishes and there is digestive suffering most of the time. When the later stages of the disease are reached there will be a considerable loss in weight, more so in gastric than in duodenal ulcer, and with a cachexia added to the anemia if the case is one of cancer.

The late symptoms of failing gastric motility, food retention, gastric dilatation, etc., while indicating a much more serious state of the patient are so evidently a part of severe pyloric obstruction that no one would slight them. They therefore do not interest us here.

Physical Examination: This is practically negative in the early case. About all one can find is a tender spot at the tip of the ensiform appendix or close by. If a palpable tumor is present, with long-standing symptoms of gastric type, the inference is justified that the case is one of cancer and probably inoperable. I do not mean by this that no operation should be done, but that when the operation is performed it usually is only palliative and not radical. There are exceptions, however, as the cases cited by Lerche[8] show: seven cases having epigastric pain, vomiting and tumor; two cases with pain and vomiting without the palpable tumor; two with pain and tumor without the vomiting. Diagnoses of carcinoma were made in seven instances, fibrous stenosis in two cases, and pyloric spasm with ulcer in one case. There was found at the operations a spastic tumor of the pylorus that disappeared under the anesthetic in five cases; the same with ulcer in one; slight hypertrophy of the pylorus in one; a cicatrix near the pylorus in two; the pylorus adherent to the pancreas in one; varicose veins about the pylorus in one; and a tiny myoma near the pylorus in one.

Diagnosis: At times the diagnosis of gastric or duodenal ulcer is easy because there is such a well-marked train of typical symptoms with proper spacing of the separate symptoms. Usually there is a question in each diagnosis, because we know how difficult it is to differentiate the one site of ulceration from the other, or to recognize an ulcer itself from many other conditions.

When it comes to the diagnosis of cancer, we are much at a loss. The early cancer has no symptoms *per se.* This I would emphasize. To expect to be able to diagnose early cancer is futile. Knowing, as I have already stated, that it is the frequent sequel of ulcer, when an ulcer is diagnosed the inference is justified that it may also be beginning malignant degeneration. Such degeneration can be detected only by careful microscopic examination, after the lesion has been excised. The differential diagnosis is helped by just two laboratory measures: analyses of the gastric contents and feces, and careful *x*-ray photographs and fluoroscopic examinations.

As a rule, the ordinary gastric examinations, test meals, etc., have given very little help in the solution of the problem. This is so true that we find Mayo saying that "the laboratory tests are relegated to minor positions," and that "the value of purely laboratory examinations of gastric contents (in ulcer) was found to have been over-estimated."

While the ordinary method of making the gastric examinations is unreliable, there is a method, originally proposed by Gluzinski, that promises better results.

Nicolaysen[9], in writing upon Gluzinski's test in the diagnosis of gastric ulcer, seems to show that this method has real value. It is based upon the facts that ulcer in the pyloric portion of the stomach, with retention, causes hyperacidity; that cancer is attended with a mucous catarrh which causes the disappearance of free H.Cl.; that during the transition from ulcer to cancer there will be found free H.Cl. up to a certain stage of the disease; but during the progress of the mucous catarrh there

will occur secretory insufficiency which will be demonstrated by giving two test meals, one immediately following the other.

The examination proceeds as follows:

1. The gastric contents from the fasting stomach.

2. A test breakfast of the white of a boiled egg and 200 cc. of water, recovered in three-fourths of an hour.

3. A test dinner of beeksteak and 250 cc. of water removed 3¾ hours later.

The stomach is washed out before and after the first test meal. The second meal is given immediately after the second washing.

The results:

Ulcers—Both breakfast and dinner give distinctly free H. Cl. reactions.

Beginning cancer—The first meal gives distinctly free H.Cl. The reaction of the second shows only a slight trace of or no free H.Cl.

Kocher has improved upon this method by determining that the percentage of free H.Cl. in the two meals is present in larger quantities after the second meal in ulcer, while in cancer this meal shows the lowest percentage of free H.Cl. The value of this method depends upon the increase or decrease in the amount of free H.Cl. in the recovered meals.

In thirty cases of ulcer, operation verified the diagnosis in twenty-seven; uncertain in two; one showed carcinomatous degeneration of an ulcer, though the test indicated simple ulcer. This test must be taken in connection with the other symptoms and with the history of the case.

I have found that free H.Cl. may decrease in the second meal in diseased conditions of the gastro-intestinal canal other than cancer of the stomach, *e.g.*, in gastro-enteroptosis with obstruction.

The test is merely one of function showing failing ability of the gastric mucous membrane to secrete H.Cl. This failing ability may be found in other conditions than in cancer. Further experience is needed to show what are these conditions.

In twenty-five cases of ulcer, all but one reacted in a manner described by Gluzinski and Kocher, viz., with a decided increase in the percentage of H.Cl. and of total acidity. This fact may be used in diagnosing lesions not ulcers, accompanied by dyspepsia. For instance, in two cases diagnosed as ulcer there was hypo-acidity, with very little increase after the test dinner. No ulcer was found at the operation, but adhesions between the duodenum and gall-bladder. Both were cured by the operation.

There was found an increase in acidity in duodenal ulcers after the second meal. It was moderate and not marked enough to be made a means of differential diagnosis between stomach and duodenal ulcers. No definite results were obtained in indigestion due to appendicitis.

Hartmann says that Meunier has recently pointed out a process that will permit of the localization of an ulcer. Empty and wash the stomach, then make a second washing with 200 grammes of a 1 per cent. solution of glacial acetic acid. When this solution comes in contact with the pylorus, the pylorus closes and the duodenum cannot be bathed with the fluid. The acetic acid solution dissolves the crystals of hematin which exist upon the surface of the ulcer however small it may be. In this fluid obtained by the second washing blood is tested for by the usual chemical processes. If there is a gastric ulcer, the reaction is positive; if the ulcer is in the duodenum, the reaction will be negative.

The roentgen photographs are the evidence upon which greatest reliance is placed. The conclusions of an expert radiologist after study of the necessary plates are about the last word in deciding upon the location of the lesion and its nature. There are mistakes made, however, and we must not pin our faith too strongly upon the *x*-ray diagnosis.

Carman[10], speaking on the value of the *x*-ray in gastric and duodenal ulcers, states that of 198 cases operated upon for duodenal ulcer, 135 had been diagnosed by the *x*-ray. Yet to show the limitations of this laboratory method he says of sixty-eight cases diagnosed as ulcer of the duodenum, twenty-nine had gall-bladder affections, seventeen had chronic appendicitis, and twenty-two had miscellaneous conditions.

The reports of Cole, Caldwell, LeWald, Quimby, Stewart, and others of our own roentgenographers in New York City give us much greater help than Carman's figures show.

We have already stated that cancer is very rare in the duodenum. Early cancer in the body of the stomach causes so few and unimportant symptoms that its diagnosis in an early stage is purely a matter of operative chance.

Because the great majority of gastric cancers are located in the pyloric portion of the stomach and usually have an ulcer for their starting point, the chances of diagnosing an early cancer in this region are much better than elsewhere. Any chronic lesion in the pyloric end of the stomach causing pyloric spasm, whether diagnosed as ulcer or as cancer, demands immediate operation. If the condition should prove to be ulcer, a possible cancer is prevented from developing. If a cancer has already begun, it may still be possible to cure the patient by the early operation.

Any *x*-ray findings that show deformity, classed

as ulcer, cancer, adhesions, gall-stones and similar intra- and peri-gastric lesions, justify operation at the earliest convenient time, certain contra-indications being taken for granted.

Jeddlicka (Rodman[3]) states that all ulcer carcinomas were encountered in the pylorus. Ulcers in other parts of the stomach did not reveal a single carcinoma.

The Living Pathology: Hartmann gives a very good summary of the appearance of ulcer and cancer as follows: "In chronic gastric ulcer the peritoneal surface is edematous, it has lost its polish, is thickened and much congested with reddish spots disseminated through the area. In a cancer plaque the serosa is altered. It has a whitish color, is nowhere congested, often shows fine white lines or a network of yellowish points. The lymph glands, in ulcer, if enlarged, are soft and movable. In cancer they are small and very hard. To the naked eye the diagnosis between a callous ulcer and cancer of the stomach wall will always be difficult." He says he attaches no importance to examinations from frozen sections. That this technic is really a snare, for the hasty examination of a few sections can give no certainty. Reliance must then be placed upon macroscopic examination and previous clinical study.

Hertzler[11] says that the diagnosis of gastric carcinoma at exploratory operation depends upon the discovery of a tumor, and the principal lesion to be excluded is indurated ulcer. Differentiation between them is not always possible, but the diagnosis is usually easily made if carcinoma is really present. Usually inflammatory masses are elastic, though dense, and the outlines are everywhere smooth. When doubt exists the mass is probably inflammatory, particularly if the mass is in the region of the pylorus. When it is situated in the lesser curvature the opposite probability obtains, and a doubtful lesion in this situation is probably carcinomatous, particularly if there are no adhesions, if nodulations are present at the periphery and small white points can be made out in the peritoneum.

Treatment: The physician holds that many ulcers of the stomach and duodenum are curable by medical measures. The surgeon maintains that such cures are only apparent, that return of the ulcer is the rule, and that the longer an ulcer lasts the greater risk there is of perforation, suppuration, hemorrhage and malignant change. Mayo expresses the opinion that "the permanent healing of chronic ulcers of the stomach or duodenum by non-operative means must be of rather infrequent occurrence," that "ulcers may appear to have healed, but the interval operation shows that they have not," that "a patient with ulcer treated medically is in far greater danger of death from hemorrhage, perforation, obstruction or cancerous degeneration than he is from operation."

I believe that the time is not far distant when the same course in ulcer of the stomach or duodenum will be followed that is observed at present in regard to appendicitis, viz., that as soon as the diagnosis is made the case becomes a surgical one and demands operation.

Cancer: If the diagnosis points unmistakably to cancer, immediate operation is imperative. The same statement is accepted by both medical and surgical practitioners if there is a *probability* that cancer exists. The type of operation cannot be determined before the abdomen is opened and a careful examination made.

If the case is so far advanced that a radical procedure is impossible, one of the palliative measures may be used. When possible the no-loop posterior gastro-enterostomy should be selected. If posterior adhesions and cancer extension forbid this, the anterior anastomosis should be done.

I have had a patient live over two years with such extensive cancerous involvement at the time of the operation that only a small part of the greater curvature of the stomach was sufficiently free of the growth to allow of a long anterior loop operation. Others have lived for a shorter time, but, with comparative comfort. And again, I have had a death follow from persistent vomiting where only the anterior loop method was possible. By these palliative operations, in the advanced cases, life may be prolonged and the patient's comfort much enhanced.

In the frankly cancerous state, but with only a moderate involvement of the lymphatics, a more radical operation is possible. A pylorectomy or gastrectomy with excision of the glands and a posterior gastroenterostomy is here indicated, or the direct anastomosis of the cut end of the stomach to the jejunum as suggested by Pòlya and endorsed by Mayo[12]. The end of the stomach is applied to the jejunum from 6 to 12 inches from its origin. Pòlya reported six cases with three deaths; Mayo performed twelve such operations with one death.

For Pòlya's operation to be successfully used, the stomach must not be dilated; it should be freely movable and the growth must be confined to the pyloric region.

In reference to whether a case is operable or inoperable, the condition of the lymphatic glands is a strong deciding factor. Yet mere enlargement of the glands does not preclude a radical operation, inasmuch as such enlargement may be inflammatory,

at least in the more distant nodes, and if all such glands are removed the chances of even a permanent cure are not entirely visionary.

If it is possible, then, to perform a radical operation, even in the presence of enlarged glands, this should be done and the glands removed as well. Furthermore, adhesion to the pancreas that requires excision of part of that gland itself has been followed by apparently permanent result, but the mortality is very high.

Each case must, then, be treated upon its own merits. Cases that were once inoperable to us become subjects for radical treatment as our experience and technical skill become greater. To leave a removable cancer is to assure a fatal termination. A fatal termination may result even if a radical operation is performed, but some apparently hopeless cases subjected to radical operations will astonish us by recovering and living for several years afterward.

Brilliant results in the surgical treatment of cancer of the stomach will not be won in the frankly cancer cases. Improvement will come here as in appendicitis, by operating early upon those cases usually diagnosed as ulcer. The consensus of opinion is that the great cause of gastric cancer is the ulcer.

From my limited knowledge, I believe that if the medical treatment of gastric ulcers year after year was admitted to be a failure, as it is, and operation insisted upon by our medical confrères, we would see a great falling off in the number of gastric cancers, especially the so common inoperable ones.

Ulcer: Given a gastric ulcer, what is its proper surgical treatment? Shall we do a pyloroplasty after Finney[13], a pylorectomy and gastro-enterostomy after Rodman, a simple anastomosis of the stomach and jejunum as advocated by Peterson in 1901, or a burning out of the ulcer with a cautery as advised by Balfour? Shall we excise or merely infold the ulcer and shall a gastro-enterostomy be added, and, if the latter is done, must a pyloric exclusion be also carried out?

Is it possible to reduce the entire problem to a series of simple statements founded on fact and experience and not be affected by the fads and fancies of anyone in particular? I think that we can accept certain propositions as proven beyond question that there are certain operative measures that all acknowledge to be rational, that these we can follow because they are simple, effective and based on years of experience. I have attempted to make such a summary in the following statements:

1. Hyperacidity is an early symptom of ulcer, gastric or duodenal. The patient's distress arises from this cause and ceases with the neutralization of the acid.

2. Pyloric obstruction follows in ulcer from a reflex spasm of the pylorus. In cancer it is due to a mechanical hindrance to the food current as well as a reflex spasm.

3. Pyloric obstruction, spasmodic or mechanical, is circumvented by a gastro-tenterostomy, short-circuiting the food current into the jejunum. The symptoms due to such obstruction are thereby relieved.

4. While most writers claim that this anastomosis cures by "drainage of the stomach" of its acid secretions and removal of the obstruction to the food current, Paterson[14] says that gastro-enterostomy does not act by drainage, but by diminishing the total acidity, due partially to a diminished secretion of chlorides and partly to neutralization of the acid by the alkaline bile and pancreatic juices which regurgitate into the stomach through the anastomotic opening. Kocher says that bile regurgitates into the stomach in nearly every case of gastro-enterostomy, but does no harm.

5. A simple gastro-enterostomy is usually curative in uncomplicated gastric or duodenal ulcers. It should be placed as close to the pylorus as possible. Paterson remarks that "the posterior operation (gastro-enterostomy) is good anatomically, but physiologically unsound; the anterior operation is good phisiologically, but anatomically bad," and again that "the immediate results of the posterior operation are better than the anterior, but as to the remote results the advantage lies with the anterior operation."

6. Old, chronic, indurated ulcers should be excised, burned out, or if at the pylorus an excision of the pylorus performed. This advice is based on the fact of the frequency with which these ulcers undergo cancerous degeneration. The procedure is, of course, in addition to the usual anastomosing operation. I believe this is sound teaching, although Paterson, Kocher, Gressot claim that malignancy follows in less than 3 per cent. of all cases after gastro-enterostomy for simple ulcer. Paterson also says that excision of simple ulcers is not based on established conclusions and is contrary to clinical experience. Von Eiselberg[15] says that the results of gastro-enterostomy are not so good with an ulcer at a distance from the pylorus as when immediately at the pylorus. Sherren claims that in chronic gastric ulcers, infolding and posterior gastro-enterostomy give results unequaled by any other operation, that this is the operation of choice, and that excision or gastrectomy are necessary only for the complications.

However, I think we will unanimously endorse Mayo's advice, that all ulcers of the stomach should be excised if possible on account of the menace of cancer. Aschoff's contention that callous gastric ulcers, which are revealed by the microscope as cancers, are really primary cancers with beginning ulceration only emphasizes the necessity of radical operation on all such lesions.

7. Just now the surgical journals are filled with arguments for and against pyloric exclusion in connection with a gastro-enterostomy. It is plain that all old, indurated, callous ulcers wherever situated should be excised and the anastomosis performed. It is also plain that if this lesion is situated at the pylorus, the best way to perform such excision is by a pylorectomy. But that after excising or burning out an ulcer in the lesser curvature or body of the stomach and making the anastomosis a further step is necessary in the shape of excluding the pylorus, I do not believe. The argument of those who contend for pyloric exclusion is based on a proven fallacy, viz., that unless the pylorus be closed the anastomotic mouth will close, that the only exit for food will again be through the pylorus, and that a return of the ulcer state will follow. Kocher does not close the pylorus. He claims that occlusion of the pylorus prevents integral restitution of the ulcer. Hartmann[16] disagrees with the commonly accepted opinion that with a patent pylorus a gastro-enterostomy will spontaneously close. He says that "the cases of anatomical obliteration of the gastro-enterostomy anastomosis were in no way connected with the permeability of the pylorus" and that "sometimes obliteration results from cicatrization of a peptic ulcer developed in the anastomotic opening. The technic has a direct bearing on the question; as obliteration is exceptional in cases not operated by the button or Y-method." He substantiates his beliefs by the report of *x*-ray examinations and animal experimentations. Nineteen of his cases showed that the stomach contents were evacuated through both pylorus and anastomotic mouth. In one case everything went through the pylorus. In eleven cases everything went through the anastomosis. In seven cases the course was through the pylorus and anastomosis.

Soresi[17] states that in a case of secondary ulceration of the gastro-enterostomy opening the orifice was plainly visible and had not contracted. This was 148 days after the first operation for ulcer of the duodenum without closure of the pylorus. He thinks that the material used in forming the anastomosis is very important, that catgut should be used for the inner, through and through suture, and silk or linen for the outside, peritoneal suture. He came to this conclusion after experimental work when he found that frequently the inner suture remained attached to some part of the anastomotic opening, preventing healing and favoring an ulcerative process. I think his suggestions very practical, provided the inner suture is not absorbed too soon and hemorrhage thus invited.

It is unreasonable to believe that an opening lined with mucous membrane will close merely because the pylorus is also patent. That such an anastomotic opening should spontaneously close is further improbable, judging the behavior of those cases where closure of the pylorus has been attempted. It is almost impossible to make the pylorus stay occluded unless a typical pylorectomy is done. Not only is occlusion of the pylorus uncertain by any other method, but it is not necessary in any case, besides adding to the time and traumatism of the operation.

Ulcers at the pylorus which require excision, *per se*, are beside the argument. These remarks apply to those ulcers which are at a distance from the pylorus, as in the lesser curvature.

In conclusion, then, *recent* gastric or duodenal ulcers, wherever situated, demand a simple posterior, no-loop gastro-enterostomy. Old, chronic, callous, indurated ulcers, whether in the stomach or in the duodenum, require excision or burning out with the cautery, in addition to the anastomosis. If this ulcer is located at the pylorus, a pylorectomy guarantees the most radical excision and should be performed in connection with the gastro-enterostomy. Duodenal ulcers are treated on the same lines, a gastro-enterostomy being performed with or without excision of the ulcer depending upon the condition of the ulcer itself. In many instances a Finney operation will satisfy every demand, besides allowing inspection of the affected area.

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THE EARLY DIAGNOSIS OF CARCINOMA OF THE BILE AND PANCREATIC DUCTS.

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The early recognition of malignant growths, anywhere in the body, is a problem that is absorbing every attention and effort of the united medical profession. Until such a Utopian era shall arrive in which neoplasms will dissolve under the powerful action of anti-cancer sera, selective chemotherapy, or some other agency, the hopes of mankind must rest in the skill and judgment of the surgeon. But only when the diagnosis of the condition is made in the earliest stages, when the threatening agent is still in the incipient period of growth, can we expect the surgeon successfully to remove the evil.

These commonplace statements apply nowhere more forcibly than in the field of new growths included under the title of this paper. It is only recently that surgeons have attempted the eradication of neoplasms of the bile ducts and pancreas; the difficulty of approach has made carcinomata of this area a *noli me tangere* to all except the most courageous operators. The last few years have shown an increasing number of reports from competent and reliable surgeons who have successfully removed neoplasms in this region. The reason why this difficult operation is not more often undertaken is, aside from the technical handicaps, because the recognition of the nature of the disease is not accomplished sufficiently early to allow the surgeon a reasonable expectation of complete excision of the malignant process.

It is no unusual occurrence to meet patients in middle age who have been jaundiced for weeks or months, suffering from attacks of cramp-like pain, losing in weight, and with acholic stools. Such cases very often defy the diagnostic acumen of the most competent clinicians, for the differential diagnosis between neoplasm, gall-stones, pancreatitis, etc., is most difficult, sometimes impossible. The usual course is to "observe" the case for a longer or a shorter period waiting for a possible stone to pass, or for the effects of medication hopefully administered, or to note variations in the depth of the icterus. This period of waiting is the golden opportunity of the surgeon, for now, if the case be new growth, it is still small and localized. The weeks of indicision and watching pass rapidly, and with them the opportunity for beneficial intervention.

Fortunately and happily, we have in the duodenal tube a new means for the early recognition of neoplasms involving the lower bile ducts and head of the pancreas. This tube, by entering the duodenum, allows of the collection of the secretion of the upper segment of the small intestine, and affords definite data of the presence or absence of the bile and the pancreatic ferments as well as of quatitative variations of the amount of each present. The data so obtained are of powerful assistance in coming to a conclusion on the cause of the illness, giving in most instances a definite diagnosis.

In order the more easily to comprehend the basis upon which such a means of diagnosis can be utilized, a few remarks on the pathology of these tumors are decidedly in place. Under the group heading of neoplasms of the bile and pancreatic ducts we need discuss only carcinoma and sarcoma, as benign new growths are so rare as to be practically negligible; in fact, the rarity of sarcoma leaves carcinoma as the main representative of this class of tumors. Cancers in this region originate from:

(1) *Common bile duct—relatively common.*
(2) Ampulla of Vater—rare.
(3) Duct of Wirsung—rare.
(4) *Papilla of Vater and Duodenal musoca about the papilla of Vater*—relatively common.
(5) Head of pancreas—less common.
(6) *Carcinoma of the stomach, gall-bladder, colon, etc., which involve the biliary apparatus by contiguity or metastases*—relatively common.

The first four varieties of tumors have the following common characteristics They are usually relatively small tumors, varying in size from a pea to a walnut, or rarely as large as a small lemon. They are adeno-carcinomata, usually of the cylindrical-cell variety, growing slowly, producing late metastases in the regional and neighboring lymph nodes, practically never in distal organs except, occasionally and late in the course of the disease, in the liver.

Early in the history of their growth they constrict the lumen of the bile and pancreatic ducts and completely obstruct it. Later in the progress of the disease secondary ulceration may occur to release again the contents of these dilated ducts, but

all these growths at some period of their existence completely obstruct one or both of the duct systems.

It is upon this point that the use of the duodenal tube rests, for by its means the complete closure of one or both ducts is ascertained. By the chemical absence of bile or pancreatic ferments in the duodenal contents, the condition is established as one of neoplasm.

It should hardly be necessary at this late day to describe the duodenal tube and its method of employment. The rapidly growing literature on the subject of duodenal intubation has made its use familiar to most readers.*

I have examined the duodenal contents of fifty-six cases in which jaundice was present, apparently because of a disease of the biliary tract or pancreas. The results can be summarized as follows:

Cholelithiasis and cholecystitis, twelve cases—bile, abundant; pancreatic ferments—normally present.

Catarrhal jaundice, one case—no obstruction to either duct system.

Impacted stone in common duct, six cases—in five of them partial obstruction to bile; pancreatic ferments normally present. In only one case complete obstruction to bile.

Neoplasms, seventeen cases—in sixteen of these cases, or 94 per cent., the bile was completely absent from the duodenum on one or more occasions on which the duodenal tube was passed. In the one case in which bile was not found completely absent, an ulcerating tumor of the head of the pancreas was discovered at autopsy. The necrosis and ulceration of the tumor had served to release the obstruction, freeing the retained contents of the ducts.

The findings in regard to the pancreatic ferments depends on the site of the tumor obstruction. If the tumor is located anywhere between the junction of the hepatic ducts and the head of the pancreas, the pancreatic ferments are always found in the duodenum, usually in normal strength, although occasionally the activity of the enzymes is diminished by the proximity of a cancerous growth. Where the tumor occupies the head of the gland and its immediate vicinity, it extends early in its course so as to completely obstruct both bile and pancreatic duct systems. In these cases complete absence of bile and pancreatic enzymes is most easily demonstrated, and is absolutely pathognomonic.

Pancreatitis, six cases have been observed. Here bile is usually only partially obstructed; the marked diminution of pancreatic enzymes is characteristic, even long before the changes take place in the stool, namely, visible increase in bulk, and excess of neutral fat and muscle fiber microscopically demonstrable.

Hypertrophic cirrhosis of the liver, seven cases. Both bile and pancreatic enzymes are increased rather than diminished in volume and strength.

Upon reviewing these duodenal findings in the several classes of cases as above recounted, one fact stands out prominently: *The complete absence of bile in the duodenal contents is characteristic of tumors involving the bile duct and pancreatic systems. This occurs in over 94 per cent. of the cases. The additional complete absence of pancreatic ferments makes the diagnosis of neoplasm absolutely certain, besides localizing the tumor at or about the head of the pancreas.* This condition is in contrast with that found in all other conditions with which neoplasm must be differentiated. Cholelithiasis, catarrhal jaundice, impacted common duct stones, pancreatitis, cirrhosis of the liver, rarely, if ever, completely block the passage of bile into the intestine. Marked diminution of pancreatic ferments speaks strongly for pancreatitis, though this occasionally happens in the presence of neoplasm in the proximity. *Complete absence of pancreatic ferments, with absence of bile, spells tumor, and only tumor.*

The complete absence of bile in new growth is probably the true explanation of Courvoisier's law, a law which states that with inflammatory and calculous obstructions of the bile duct, the gall-bladder is usually not palpable, while in neoplastic obstruction the gall-bladder is easily palpable as a large globular mass in the hypochondrium. As long as some leakage through the common bile duct is allowed, the gall-bladder does not fully distend, but when the obstruction is complete as with tumor, the distention of the gall-bladder reservoir is maximum.

It has been stated above that 94 per cent. of cases of neoplasm situated on the biliary and pancreatic systems cause complete obstruction of one or both ducts. What class of case is represented by

*For full details of the employment of the duodenal tube as well as for the collection of the chyme and its chemical examination in my hands, I refer the reader to my earlier publication in the *American Journal of Medical Sciences,* 1913, CXIV, 393. In this paper technic and methods are fully considered. Suffice it to say that a thin rubber catheter, one meter long, having at one end a weighted metal perforated capsule (I have always employed the Einhorn duodenal pump), is swallowed for a distance of 80 cm. This is done at night, and the next morning, two hours after a test meal of milk is drunk, the tube, the metal end of which is now resting in the duodenum, is aspirated and the duodenal contents removed. Simple chemical methods give the information as to the presence or absence of bile and pancreatic ferments, and the quantitative strength of the latter.

the remaining 6 per cent.? This question leads us to the smaller group of tumors, in which secondary ulceration has advanced to such a degree that the body of the tumor is necrotic and absent, and the dammed back secretions in the ducts seep through the fungous new growth mass. In these cases the diagnosis by means of duodenal content analyses is faulty, and an error is avoidable only when the total evidence is considered and weighed. These cases of ulcerating tumors with only slight obstruction present a distinct clinical picture which clearly differentiates them. They are usually advanced cases, in which jaundice has been present for weeks or months; frequently the history states clearly that the icterus had been very marked, and then suddenly had almost completely disappeared; occasionally one sees such a case for the first time when the jaundice has reappeared, and the physician is at a loss to explain the recurrence of the symptoms. The preliminary stage of icterus is usually regarded as a catarrhal jaundice and the clearing up of the symptoms is naturally expected and anticipated.

But there are features of these ulcerating new growths which are quite characteristic. They spring usually from the duodenal surface of the papilla of Vater. In the course of their ulceration, ascending infection of the biliary passages takes place. Secondary hemorrhage from erosion of vessels is almost the rule, either microscopic bleeding or large and dangerous hemorrhages. Emaciation is rapid. A marked leucocytosis is constantly present. The duodenal contents of such a case, taken in the later period, shows only partial diminution of bile, and normally present ferments. But the clinical picture is easily identified and the diagnosis must be made in spite of the duodenal findings. Jaundice, remitting temperature of the so-called "septic" type, leucocytosis, and blood in the intestinal contents definitely characterize ulcerating tumor of the papilla of Vater. Fortunately, this type of case is not common, and in the great majority of instances the complete absence of bile and ferments is ascertained at the first or surely the second examination.

Another point in the early diagnosis of biliary and pancreatic new growths by means of the duodenal tube is the differentiation from chronic pancreatitis. Of course, where the inflammatory process in the gland has extended so far as to cause gross changes in the character of the stools, namely, pale and bulky defecations with large excess of neutral fat and muscle fibers, the differentiation is simple. It has been my experience with tumors of the pancreas proper that, though they may completely obstruct and prevent all passages of enzymes into the intestine, yet none of the characteristic changes of pancreatic disease occur in the stool; except very late in the disease when complete infiltration and destruction of the parenchyma of most of the gland may also cause the typical alvine evacuations. In order to differentiate early pancreatitis from beginning carcinoma the examination of duodenal contents is dependable, offering in fact the only reliable means at hand. In chronic pancreatitis, bile is usually present, though rarely it maybe diminished or absent when a sclerosing process of intra-acinar nature is mainly localized at the head of the gland. The enzymes of the gland, however, are always present but *in distinctly diminished quantity*, giving weak reactions to the usual chemical tests. On the other hand, in tumor, bile is practically always absent; the pancreatic ferments are either normal (when the neoplasm is situated above the junction of the bile duct with the duct of Wirsung), or completely absent (if the tumor occupies the head of the gland and the ampulla or papilla of Vater). All other clinical means of differentiation fail in the early cases before the typical stool changes if an inflammatory process occur. An enlarged palpable gall-bladder may occur in either; pain, even of a violent character, may be noted in either disease; fever, emaciation, jaundice are symptoms that may be common to both conditions.

Let us then review the proper steps in approaching the differential diagnosis in the case of an adult suffering from a condition of obstructive icterus, with abdominal pain, emaciation and pale stools, the whole duration of the symptoms being a few days or a few weeks. To begin with, a careful perusal of the history may disclose some interesting facts. A history of longer duration with an uninterrupted course reminds one of a chronic disease, for example, chronic pancreatitis or hypertrophic cirrhosis of the liver; also of cancer. A history of an interrupted or remissive jaundice may point to cholelithiasis or, also, ulcerating neoplasm of the papilla of Vater; such remission rarely occurs in pancreatitis. In the physical examination there are also some important data to be obtained. The palpation of a large hypertrophic liver is quite characteristic; particularly when accompanied by a palpable and enlarged spleen. The slight increase of the size of the liver met with in cholelithiasis or carcinoma of the bile ducts is less noteworthy. Metastatic carcinomatous nodules (occurring as small growths secondary to neoplasms originating in the bile ducts or about the head of the pancreas) are practically never palpable in the free edge of this organ.

A globular, enlarged gall-bladder may signify either new growth or sclerosing pancreatitis; the absence of a palpably engorged gall-bladder does not rule out neoplasm, as the tumor may be of the ulcerating type without complete obstruction of the biliary system.

Fever of an irregular, remitting variety, and an increase in the leucocytes in the circulating blood, occur in both common duct stones (with secondary cholangitis), and in ulcerating neoplasms involving the duodenal mucosa (with secondary cholangitis). With calculi, chills are more likely to occur; in ulcerating tumors, bloods, either gross or chemical, is almost invariably found in the feces.

The stool examination may now be conclusive, for the characteristic bulky pale stool with excess of free neutral fat and muscle fibers is unmistakable as a sign of pancreatitis. (An artificial diarrhea caused by saline cathartics may give neutral fat and excess of muscle fibers in the feces in a case of obstructive jaundice not of pancreatic origin; one must be guarded against making such an error.) Blood in the feces is strong presumptive evidence of tumor, as also is complete failure to demonstrate bilirubin in the intestinal evacuations.

The examination of the gastric contents throws little or no light on the diagnosis. Hyperacidity may occur with cancer of the head of the pancreas (I have seen a case with a total gastric acidity of 102 per cent.), and anacidity with inflammatory conditions. I have noted complete achylia with biliary calculi.

It is reserved to the examination of the duodenal contents to decide the question of diagnosis. Rather than repeat what has already been several times said in this article, the following scheme is offered portraying the results of the examination of the duodenal juice for bile and pancreatic enzymes:

	Bile	*Pancreatic Enzymes*
Catarrhal Jaundice	Present	Normally present
Cholelithiasis or Common Duct Stone	Diminished	Normally present (unless associated pancreatitis)
Cancer:		
1—Of the biliary ducts above the junction with the pancreatic system	*Absent*	*Normally present*
2—At the head of the pancreas involving both duct systems	*Absent*	*Absent*
Pancreatitis (chronic)	Present (may rarely be absent or diminished)	*Markedly diminished*
Hypertrophic Cirrhosis of the Liver	Increased	Increased
Pancreatic Calculi	Present	Absent

Of what avail is the early diagnosis of carcinoma of the biliary and pancreatic systems? There is an increasing number of surgeons who do not hesitate to attempt the problem of the radical removal of these neoplasms. Czerny, Korte, Kraske, Mayo, Halstead and many others have successfully accomplished this apparently unfeasible operation, with a promising proportion of permanently beneficial results. An early and prompt diagnosis in these dubious cases with the abolition of the present usual waiting period for "observation purposes" will make possible a greater number of surgical attempts and a greater proportion of successful attacks.

After a careful review of the surgical literature, the method proposed and carried out by Kausch (*Beitr. zur Klin. Chir.*, 1912, LXXVIII, 439) seems to be the method of choice. He suggested and has performed a two-stage operation, in the first stage of which a preliminary cholecyst-enterostomy is performed, with the object of relieving the jaundice, improving the nutrition of the patient and diminishing the coagulation time of the blood. In the second stage (which should follow in from two to four weeks), a radical excision of the tumor is attempted. The head of the pancreas as well as the adjoining wall of the duodenum and the common bile duct are removed when involved in or adjacent to the neoplastic mass. The upper end of the severed duodenum is then closed blindly; the distal cut end is drawn over the resected head of the pancreas and sutured *in situ*, so that both bile and pancreatic secretion drain into its lumen. Gastro-enterostomy then completes the operation.

The operation is truly a large undertaking, dangerous to the patient, one with a high operative risk. The operative mortality is about 43 per cent.; death from metastases or late subsequent infection is 38.5 per cent.; permanent cure is 19.5 per cent.

(observed six months to six and a half years after operation).*

One predominating characteristic of tumors in this region offers much encouragement to the surgeon. They grow slowly, remaining relatively small for months, and form metastases late in their course only months after the beginning of the process. This fact, coupled with the prospect that the duodenal tube will offer a means of diagnosis both early and definite, should make the attempts at radical removal of these neoplasms of much greater frequency, and should associate with these attempts the increasingly splendid results that have marked the advance of modern surgery from year to year.

41 WEST EIGHTY-THIRD STREET.

*These figures are compiled from the article by Clermont in the Rev. de Gyn. et de Chir. Abdom., 1913, XX, 33.

THE EARLY DIAGNOSIS OF CANCER OF THE RECTUM.

JEROME M. LYNCH, M.D., F.A.C.S.,

Professor of Rectal and Intestinal Diseases, New York Polyclinic; Lecturer, Cornell Medical School; Attending Proctologist, St. Mary's Hospital, Hoboken, N. J.; Consulting Surgeon, N. J. State Hospital; Consulting Surgeon, Nassau Hospital, Mineola; Assistant Surgeon, M. R. C., United States Navy.

NEW YORK.

Startling is the increase of deaths from cancer during the last fifty years, the latest reports showing an advance of over 200 per cent.! Bell estimates that, at this rate, 25,000,000 of the world's population must die of cancer. Facing this, is it surprising that millions are being spent and men are giving their lives in the study of this grim and devastating disease?

Next to the stomach, the caudal extremity of the human alimentary canal is the most frequent seat of malignant disease.

Bloodgood has well said that in the life history of every malignant growth there has been a moment when it was surgically curable, and the lesions under consideration offer no exception to his admirable axiom. To recognize and to seize upon this precious moment is no less than to control the very destinies of the afflicted individual. Blind as we are to the intimate cause of cancer, we see clearly and distinctly certain remote factors whose very remoteness paradoxically increases their importance.

The termination of the hindgut, which has a blind caudad extremity, forms the rectum, whereas an inflection of the ectoblast forms the anus. Dividing these structures there is a membrane which later breaks down, giving outlet.

This is analogous to the condition at the cephalad end. In the ectoblastic part there is a very abundant lymphatic and nerve supply which gradually decreases cephalad so that 2 to 3 inches from the anus there is at birth practically no sensation. These two factors have great prognostic and diagonistic value. Malignant growths are lethal in direct proportion to their nearness to the ectoblastic tissue, and this is significantly true at both the cephelad and caudad extremities of the alimentary canal.

This complementary relationship of lymphatics and nerves is an undoubted example of the balancing or equilibriating power of nature ,always to be found if sought for. As pain is the normal protection of the tissues from injury throughout the body, so in the anus malignancy, or its forerunner, is more quickly recognized by subjective sensations than similar conditions cephalad to the anus. This is what should be expected, for the loss of pain sense is compensated for by proportionate diminution of the lymph supply and of the consequent malignancy.

At best we can only theorize as to the cause of cancer, but it would seem reasonable to suppose, and on this many experienced investigators and surgeons are agreed, that cancer nearly always develops at the site of a chronic irritation. An example is furnished by the men of Kashmir, who wear the Kangri baskets close to the abdomen and a large percentage of whom there develop cancer. Again, the chimney-sweep's cancer is produced by irritation of the scrotum by soot. Smoker's cancer and many other types are familiar examples of this irritation cause. Now, it is a singular fact that cancer occurs most frequently in those sections of the alimentary canal that are subjected to chronic insult and irritation; note cancer of the pylorus and cancer of the rectum. This being the case, chronic constipation must have an important bearing on the development of rectal carcinoma. The same may be said of ulcerative or infectious conditions. The majority of rectal cancers occur at the peritoneal reflection.

The earliest sign of cancer is constipation. This occurs irrespective of the size of the growth or of its encroachment upon the gut lumen. It is equally true of laterally implanted growths, as of the annular types. It is next to impossible, by either catharsis or enemata, to empty the bowel of the fecal mass which accumulates in the dilated pouch just oral to the growth. We have confirmed these observations repeatedly, especially in the case of minute recurrences which could not possibly in themselves offer any excuse for mechanical obstruction, the bowels having been regular since the first

operation and up to a short period before the recurrence. This inhibition is perhaps associated with nature's effort to cause a recession of the growth. It is common practice to associate diarrhea with a new growth, but, of course, diarrhea is not evidence of the absence of constipation, for the most persistent diarrheas are those associated with constipation. The frequent and imperative desire to defecate is not properly a diarrhea, but a mere subjective reflex without objective basis.

The fact that constipation had been noted by the patients themselves is only 30 per cent. of our cases does not mean that constipation is not the first symptom. Many of the patients who complained of diarrhea were in reality constipated, for after thorough catharsis and enemas we found, at operation, impaction of the bowel above the growth.

The presence of mucous and blood in the stools is so common a condition that it attracts little or no attention on the part of the patient. Next to constipation it is the earliest symptom and may even exist before constipation, as any slight irritation of the bowel causes an outpouring of mucous.

The usual history given by a cancer patient is as follows: He will state that up to a certain date he was well, then a change took place, the exact nature of which it is usually difficult for him to describe. This condition was followed by gradually increasing constipation or diarrhea. Subsequently, he had an imperative desire to move the bowels, with a feeling of unfinished stool. This occurred perhaps once or twice a day at first. The movements were explosive; he may have noticed a little blood, clotted passed blood mixed with mucous and feces. Then he was aware of an uncomfortable feeling in the pelvis; knew there was something wrong without being able to define it. As time went by, the desire to go to the toilet became more imperative and more frequent; he had to go several times during the day and the first thing in the morning. A little later on, he suffered from indigestion, sleeplessness, and had to empty his bowels several times during the night. There may or may not be a loss of weight; as a general rule the appetite is variable; occasionally nausea is present. This is the history of the average patient. We have seen cases where the only symptom was a passage of a little blood during or after a movement. Sometimes it is noticed on the paper, at other times in the toilet. We have seen a good many cases where the first symptom was a very severe hemorrhage, followed later by a quiescent period and then the usual symptoms. The history, no matter how carefully taken, is not of great value in the majority of cases, because there are few patients so observing as to be able to furnish reliable data of their condition. As a general rule, when the symptoms are so pronounced as to attract the attention of the patient the growth is well developed, not necessarily inoperable, but well advanced.

Cancer can be diagnosed in any stage by a protoscopic examination. Unfortunately, protoscopy is not a routine measure and the symptoms are common to other diseases. Therefore, cancer is rarely discovered until it is well advanced. *Unluckily, most physicians share the view of the patient that his symptoms are trivial and they neglect to make either a digital or a protoscopic examination.* Consequently cases are far advanced before they come to the specialist, and anyone familiar with the disease could make a diagnosis from the history alone in this stage. In fact, many patients that come under my observation have already an inkling of their malady.

The symptoms are constipation, diarrhea, blood and mucous in the stools, a frequent desire to defecate and a feeling of unfinished stool. *If, whenever* ANY *of these symptoms come to our notice, we made a protoscopic examination, cancer would be discovered in a large proportion of cases.* By waiting until all these symptoms are present, the cancer will be well advanced before discovered. If we made this examination regularly, regardless of symptoms, cancer of the rectum would be discovered in its incipiency. Early diagnosis is impossible at present because of the lack of a regular, systematic examination of the bowels. This applies, of course, only to cancer of the rectum and the sigmoid apex, but as the rectum, after the stomach, is the most frequent site of cancer in the alimentary canal, we have here a golden opportunity to make an early diagnosis by including protoscopy as a part of a routine procedure in every case coming under our care, just as we now make an examination of the lungs, heart, blood, urine, or feces. Any physician failing to make proper examination of the heart before operating, or of the urine, would be severely censured, yet how many doctors neglect to make a rectal examination! And there is more room for doing good by having a thorough rectal examination than by an examination of the feces. Therefore, educate physicians to include protoscopy in the routine of a general examination; educate the public as to the frequent necessity of this procedure. Just as a patient goes to his dentist every six months, so he should have his bowels examined just as frequently if not oftener. Educate the public to the necessity of an immediate ex-

amination in the presence of any of the symptoms given, either one or all. When the time comes that the public and the physician are educated to the meaning of these symptoms, cancer in at least one part of the anatomy will be discovered in time and cured by operative measures.

In conclusion, let me urge that every patient suffering from constipation, diarrhea, blood, pus or mucous in the stools, especially hemorrhoidal cases, should be protoscoped before measures for relief are instituted. I have purposely omitted other diagnostic adjuvants, such as the Abderhalden reaction, blood reaction, and many others that are useful in cancer in other parts of the intestinal tract, but are superfluous in cancer of the rectum.

The following table gives the results in our operated cases to date:

	Cases Operated Upon.	Recoveries.	Deaths.
Adenocarcinoma	144	106	37
Epithelioma	5	5	
Sarcoma	7	7	
Colloid Car.	2	2	
Scirrhous Car.	2	2	
Malig. Papilloma	6	6	
Malig. Condylomata	1	1	
Malig. Stricture	1	1	
Totals	168	130 (77%)	37 (22%)

Of the 130 recoveries, we have reports from 58 to date; 39 were well without evidence of recurrence after three years, and 19 reported recurrences.

We are now endeavoring to locate and gain further reports from all the cases operated upon, and hope to publish soon a more complete tabulation.

108 EAST SIXTY-FIFTH STREET.

THE AMERICAN SOCIETY FOR THE CONTROL OF CANCER.

The American Society for the Control of Cancer was organized in 1913 as a national association "to disseminate knowledge concerning the symptoms, diagnosis, treatment, and prevention of cancer, to investigate the conditions under which cancer is found, and to compile statistics in regard thereto." The society is conducting in its own field a campaign of education analogous to that of the National Association for the Study and Prevention of Tuberculosis.

Examine the rectum in all cases of tumor of the liver. Likewise, before operating for cancer of the rectum examine the liver for metastasis.

Courvoisier's law *usually* holds—palpable enlargement of the gall-bladder with distinct jaundice is significant of carcinoma; the jaundice of common duct obstruction by a stone is not associated with enlargement of the gall-bladder.

HAVE "CANCER ON THE BRAIN": A PLEA.

J. H. CARSTENS, M.D.,
Professor of Abdominal and Pelvic Surgery, Detroit College Medicine and Surgery.
DETROIT.

When we consider that one woman out of every eight dies of cancer, and one man out of every thirteen, it certainly behooves us to exert ourselves in every direction to control that great menace to the human race. When we consider that tuberculosis has been checked and controlled to a wonderful extent in the last fifteen to twenty years, we have a right to assume that we can also minimize the terrible scourge of cancer by vigorous efforts.

In the present state of our knowledge we have no remedy or mode of treatment that will check or cure cancer in any stage of its existence, except its complete removal by surgery.

Like all things, a cancer must have a beginning, one that is minute and cannot be seen. A cancerous growth gets to be the size of a millet-seed, then that of a bean, then of a hickory nut, and thus continues to grow. When it is small no lymphatics are involved, and if we find it thus early and cut it out, the system is free of it and continues so. Hence, at the present time the whole question of treatment resolves itself into that of early diagnosis; and the question of early diagnosis almost entirely depends upon the medical practitioners' *looking for the disease constantly.* I know that many people do not consult a physician early enough, for they have no pain, and the disease is all too often far advanced before the doctor is consulted for these cases, and the profession cannot be blamed for those.

In order to make an early diagnosis when a cure by surgery is possible, it is therefore necessary that the members of the medical profession should be constantly on the alert, to have what I call "cancer on the brain" and consider every patient in the so-called "cancer age" to probably have cancer. Yes, it is advisable to look for it in those quite young. I have seen quite a number of people in the last few years, 20, 25, and 30 years old, who had cancer advanced beyond all help.

Every medical man must constantly have before his mind the possibility of cancer, and when that patient complains of soreness in the breasts, excessive flowing, or trouble in the stomach or bowels, or chronic irritation of the skin, *always think of cancer, cancer, cancer.* The greatest difficulty will be to educate the laity, and still as it has been educated on the tuberculosis question, there should be no trouble to do the same thing with the cancer question, if only vigorous efforts are made.

I have induced the Michigan State Board of Health to issue a Cancer Circular (Figs. 1 and 2), which was distributed among the profession and by them among the people. We have also worked with the lay press in writing articles on this subject, in order to *arouse the public to the danger in not diagnosing cancer early enough.* A good deal of that work has been done in the State of Michigan. In some states little has been done in this direction. More should be done everywhere. I have advocated the creation of a certain day in the year to

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PUBLIC HEALTH,

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Published Quarterly by the State Department of Health, Lansing, Michigan.

CANCER

AND

HOW IT MAY BE CURED.

READ, AND PASS ON TO YOUR NEIGHBOR.

Copies of this pamphlet may be obtained, without cost, by addressing the Secretary, Lansing, Michigan.

[Entered at the Postoffice, at Lansing, Michigan, as second-class matter, under Act of March 3, 1885.]

Fig. 1.

be called "Cancer Day," when every newspaper in the land should print an article on the subject, and every minister should preach from the pulpit on the cancer question, and every doctor should talk all that day wherever he goes on *cancer, cancer, and nothing but cancer.*

If every physician would thoroughly examine every case, he will be able to make a diagnosis early, when something can be done. If every woman with an excessive or an unusual vaginal discharge will be examined, if a little tissue be removed from the uterus which looks suspicious, and this be subjected to microscopic examination, many cases of cancer will be caught at the very beginning. And if every lump in the breast will be removed, every cyst, hardening or induration, or ulcer extirpated and subjected to a thorough pathologic examination, cancer will often thus be diagnosticated early. If every stomach or bowel trouble, instead of being allowed to drag along, would be subjected to a thorough investigation, if necessary even to an exploratory celiotomy, many more cancer cases will be recognized early. *If we can get the lay people to understand that an excessive flow, or irritating discharge, and a little enlargement or growth, or a continuous pain may mean uterine cancer,* and that the medical man should be consulted early, much

CANCER

AND

HOW IT MAY BE CURED.

I.

CANCER IS CURABLE.

Cancer is curable, if it be operated upon in its early stages.—If it be left to grow and develop, cancer is always fatal. It may be partially removed when in an advanced stage, and relief may be had for some time after operation; but beyond the early stage, cancer cannot at present be permanently removed, nor permanently cured. Permanent cure of cancer is possible if the afflicted person obtains an early diagnosis, and receives early attention from a skilled surgeon. **The only permanent cure for cancer known at the present time is early surgical operation.**

II.

HAVE OPERATIONS FAILED TO CURE?

Very few persons die from operation performed by skilled surgeons for the removal of cancer. Where cancer operation is done by experienced surgeons, the fatality in America for the past fourteen years is less than one case out of a hundred,* or in other words, ninety-nine persons out of a hundred survive operation for cancer.

* "The Cancer Question," by John E. Summers, in The New York Medical Journal, February 27, 1909

Fig. 2.

untold misery may be prevented and many lives prolonged. *It is carelessness that prevents the early recognition of this great scourge.*

Until we find the real cause or some specific cure, we are forced to preach the doctrine of early diagnosis and surgery, and in order to do that we must allow ourselves to be accused of having "Cancer on the Brain," by preaching, day in and day out, the story of cancer, cancer, cancer.

1447 DAVID WHITNEY BUILDING.

MAMMARY INVOLUTION AND CANCER.

I wish to state it as my conviction, and to state it as positively as I can, that it is not possible for mortal man to differentiate between cancer and abnormal involution in more than three-fourths of the cases. I do not care how closely one studies the remaining 25 per cent., he will not be able to make an accurate diagnosis before operation.—WILLIAM L. RODMAN, in the *Pennsylvania Medical Journal.*

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WALTER M. BRICKNER, M.D., Editor

NEW YORK, JULY, 1915.

THE EARLY TREATMENT OF CANCER.

The propaganda to educate the public to the danger of ignoring the early signs and symptoms that may betoken the development of cancer, an altogether desirable propaganda, will surely aid much in the universal fight against this great and common menace to human life. Very many women appreciate that a lump in the breast is a serious condition; women—still far too few of them, to be sure—are also slowly learning that irregular bleeding and vaginal discharges are not to be ignored as inconsequential accompaniments of the menopause. And so we may expect by public instruction that many people may yet be brought to realize that persistent "dyspepsia," developing constipation, a bloody stool, a single hematuria, are also signs that may portend a malignant growth and must be competently investigated.

Yet, obviously, there are limitations to what the education of the public can accomplish towards bringing about the early recognition and treatment of malignant growths. What is more important is to impress the members of the medical profession generally—the custodians of the people's health—with the responsibility that presses upon them of making *early* diagnoses of cancer by the employment, in every case that suggests the possibility of such a condition, of all the diagnostic aids that such case may require.

Pursuant of such purpose, and at the commendable suggestion of the Cancer Commission of the Pennsylvania State Medical Society, the JOURNAL, synchronously with many other medical journals, is devoting this issue exclusively to *Cancer*. We commend to our readers, however familiar they may be with the subject, the careful perusal of all the excellent contributed articles. Written by men of authority in their specialties, they deal with the early diagnosis of cancer in each of the regions of the body, except the skin, in which it commonly occurs. All of these articles preach the same text: that our present means of treating cancer must be invoked when the disease is still young, that there is no clear-cut symptomatology of early cancer in *any* part of the body, that there is no known treatment to be considered other than radical extirpation. The very interesting article of Dr. Woglom emphasizes from the pathological side these clinical dicta.

Surgery is not an ideal treatment for cancer, it is not, speaking generally, even a satisfactory treatment. But it does save lives; and the numbers of its failures to do so are directly in proportion to the delays in invoking its aid.

There is, as yet, no specific test for the presence of a cancer in the body, and so, if the disease is to be recognized and dealt with early, *it must be sought for*. Every symptom that suggests the possibility of a neoplasm must be studied *thoroughly* until it is *adequately* accounted for. To dismiss such symptoms as inconsequential, to "observe" them until they become outspoken evidences of malignancy is to place upon oneself the responsibility for the death of a fellowman. Repeated headaches and failing vision, pains in the jaws and ears, ulceration of the skin, tongue or mouth, developing hoarseness, dysphagia, persistent pain in the chest or dyspnea, lump in the breast, persistent "dyspepsia," developing constipation, bloody or mucous stools, a single hematuria or difficulty in urination, irregular uterine bleeding or discharge, "sciatica," "brachial neuritis"—each one of these, and many other such symptoms, must be promptly investigated as of possibly cancerous source by all the necessary diagnostic means—ophthalmoscopy, laryngoscopy, esophagoscopy, practo-sigmoidoscopy, cystoscopy, radiography, careful palpation, chemical analyses, tissue removal by knife or curette for microscopy, *early* exploratory operation. Nothing less than these will do. No less thorough investigation will discharge the obligation to the patient to determine the possible presence of a cancer while it is still curable.

No longer can the excuse be accepted that a community does not afford the facilities for these

examinations. The rural practitioner must, as very many of them indeed do, equip himself competently to conduct many of these examinations. For the other tests and examinations, there are few communities in this country which are too remote from those who can conduct them. Neither distance nor poverty will excuse failure to secure adequate pathological or other investigation. The medical profession, rural and urban, never has and never will deny its aid to those who cannot pay for it. *The responsibility is ours. The time to think of cancer is always. The time to deal with it is before it has passed beyond the stage of doubtful diagnosis.*—W. M. B.

THE EARLY DETECTION OF UTERINE CANCER.

Even though there may be forthcoming a reliable serum test for the presence of cancer in the body, we shall still be confronted in many cases with the problem of locating the growth. Between carcinoma and syphilis there is the very important distinction that the former remains local for a comparatively long time, during which there are none of the constitutional phenomena indicative of a blood infection. Moreover, the initial lesion in syphilis is usually situated on the surface of the body, where it may be readily seen. *Concealment* and *insidiousness* are the lurking characteristics of visceral cancer; its real malignancy lies more in this concealment than in the other ravaging symptoms that it is responsible for.

Hemorrhage and metastasis, near and remote, are signs of a well-established cancer. When one has these symptoms the possibility for a cure becomes very doubtful. Some cancers grow to a very large, practically inoperable size without giving rise to any alarming symptoms. There are other cases in which the first sign of a lurking cancer is well-marked cachexia; the growth in these instances of a decidedly proliferating type and of extreme malignancy. Only infrequently does a cancer cause symptoms early and for a long time before it becomes inoperable.

True early symptoms, that is, before ulceration and necrosis occur, are unknown. Educational propaganda intended to inform *women* concerning early symptoms are well meant, but very little hope can be attached to it. To get early cases *physicians must seek them,* must be constantly on the lookout for them. Newspaper publications may urge upon women of child-bearing age and older the importance of having themselves examined at stated intervals. That is all the medical profession should expect of the lay public and that is all we may demand of them. *The burden of discovering cancer early rests with the medical profession.*

Until the laity is educated to this routine prophylactic examination we may avail ourselves of the opportunity offered by the clinical examination that women submit to for other affections of the body, to exclude or detect cancer of the uterus. We feel that no physical examination in a married woman is complete without investigating the status of the generative organs, and no examination is complete without determining whether there is suspicion of a cancer. The exclusion of the latter should be as much the clinician's duty as the exclusion of tuberculosis.

The methods of inquiry for the presence of cancer are not very difficult; they entail no complicated serological technic. They are well-established methods of physical examination. They include *careful palpation, careful inspection,* the *introduction of a uterine sound in every instance of suspicion of cancer* where pregnancy can be excluded, *diagnostic curettage, diagnostic excision* (biopsy), and the *resort to pathological examination of this material.* It may further be added that many an unsuspected carcinoma is discovered in the laboratory where careful routine examination is made of all organs and parts of organs that are removed. It is well to remember in this connection that of approximately 600 specimens of uterus removed for other reasons than cancer, the latter was nevertheless found by Schottlaender twelve times, *i.e.,* in 2 per cent. of cases. These could undoubtedly have been located by careful gynecological examination supplemented by the minor surgical operations recommended.

True, early cases of cancer will probably be encountered very infrequently in spite of the most painstaking search. It is encouraging to think, however, that of 135 cases of uterine cancer in Schottlaender's series, eight were found to be of very young growth, so much so that the parametrium was free in all of these eight cases. There is no reason why ultimately the percentage of early cases should not be increased. There is no reason why the experience acquired by gynecologists abroad should not also in time come to us.

While our endeavors are bent in the direction of establishing an early diagnosis of cancer of the uterus, one immediate effect will be to make the inoperable cancer a thing of the past; the great body of women suffering from cancer of the uterus will then get the benefit of surgical treatment when a permanent cure may be confidently expected.—I. C. RUBIN.

Surgical Suggestions

It should be impressed upon women that the prognosis after hysterectomy for carcinoma confined to the body of the uterus is usually good.

Bismuth *x*-ray pictures may reveal a carcinoma of the bowel too small to be palpated through the abdomen and too high to be seen or felt through the rectum.

It is awkward to determine only on the operating table that a patient prepared for a hemorrhoid operation has a cancer of the rectum. It is also inexcusable.

The youth of a patient should not be allowed to allay a suspicion of cancer. Cancer occurs in the breast of very young virgins; it is by no means unknown in the rectum of young subjects.

The shrinkage or even almost total disappearance of a carcinomatous mass from the injections into it of any medicament is not to be taken by itself as indicating a specific value for that medicament.

The discharge of blood and mucus with the stools, or without them, is always suspicious of a carcinoma of the lower bowel. If none is felt in the rectum, examine the bowel above with the sigmoidoscope.

Cancer of the cervix uteri is essentially very malignant and only when it is recognized early can the hope of cure be held out, even if submitted, as it should be, to radical hysterectomy.

Hematuria is usually the first sign of a bladder cancer. The passage of bloody urine, even though it is not soon repeated, is sufficient indication, in an adult, for a cystoscopic examination.

Cancer of the *body* of the uterus, not extending beyond the viscus, is one of the least malignant forms of carcinoma and a permanent cure after simple hysterectomy may be anticipated.

If more of the profession would come to look upon the uterine curette as a diagnostic instrument chiefly, more women would be saved from the development of inoperable uterine cancer.

The recognition of cancer of the stomach and intestine in *x*-ray pictures requires experience. If the roentgenologists in your community haven't that experience it is probably because you and your colleagues haven't encouraged its development. Your patients are the chief losers.

The gravest danger from postponing operation for cholelithiasis is the development of carcinoma of the bile tract. Empyema, gangrene and rupture of the gall-bladder are more common sequelae, to be sure, but even these late developments of cholelithiasis are usually amenable to prompt surgical treatment.

A condition sometimes mistaken for breast carcinoma is enlargement of one or more of the anterior thoracic (lower axillary) lymph glands, usually due to an infection (*e.g.*, a furuncle) about the "corset line." It causes a swelling, often deceptively hard at first, close to the upper, outer border of the breast.

Marked constipation (not habitual), mucous and bloody discharges, with or without pain and loss of flesh, not promptly yielding to treatment, are sufficiently significant of a neoplasm to indicate the necessity for an exploratory laparotomy, if colonoscopy, radiography and palpation have failed to locate the lesion.

If constipation develop in an adult, exclude intestinal neoplasm before treating the condition as functional. Carcinoma of the sigmoid, for example, may exist for some time without any other symptom than constipation until obstruction or perforation suddenly develops. Sigmoidoscopy or bismuth *x*-ray examination will usually locate such a condition. These should be employed, therefore, in cases of recent adult constipation of unknown cause.

Operation for adenoma of the prostate (so-called prostatic hypertrophy) should not be long delayed if the patient is a "good surgical risk," even though obstruction is not marked nor continuous, for sometimes these adenomata conceal small areas of carcinoma, unrecognizable except by the microscope. Removed thus early, the patient is usually cured; left to grow into the capsule and surrounding tissues, the condition is usually hopeless.

ANNOUNCEMENT.

Much interesting cancer information, contributed and editorial, we were obliged to omit from this issue for lack of space. This will appear in the August number of the Journal.